The Automobile

Vol. XXXIV
No. 25

NEW YORK, JUNE 22, 1916

Ten cents a copy
Three dollars a year

Stewart $6

Motor Driven Warning Signal

Some Orders—

Last week we took an order for 10,000 Stewart Warning Signals.

Only a couple of weeks ago we took another order for 40,000.

Several days ago we received one for 8,000.

And so it goes.

The Stewart Warning Signal is the recognized standard signal of the industry.

It has the quality and the "staying powers."

It's the fastest selling signal in America.

"No car is better than its accessories"

The Stewart-Warner Speedometer Corporation
Chicago, Ill., U. S. A.

VOL. XXXIV NEW YORK—THURSDAY, JUNE 22, 1916—CHICAGO No. 25

Steamship Waubic, at Killarney, from which point the S. A. E. made a trip through the islands

S.A.E. Decides To Change Title

To Include Aeronautic, Tractor and Motor Boat Engineering—New Name Society of Automotive Engineers

THE S. A. E. may change its name without changing its initials. In consequence of the wish of the United States Government to get all the help it can, especially for army and navy purposes, from the engineering societies, the summer meeting on board the S. S. Noronic was asked by President Huff, by Henry Souther and by Howard E. Coffin, whether it would enlarge its field and take steps to become of as great a value to the other engineers mentioned above as it has been to the passenger car and truck industry. Such an enlargement, according to President Huff, would mean an extension of the membership list to huge proportions. To-day there are 2000 members, and the bigger total of 5000 should be easily reached.

It is obvious that the development of aviation and tractor engineering is very rapid at the present moment and it has been suggested that the society ought to make quite clear the fact that its scope includes these branches of the automobile industry. It has been suggested by prominent men in the world of aeronautics that the society should immediately start work on standards for aircraft. The tractor manufacturers have need for certain standards and on these the S. A. E. and the National Gas Engine Assn. have been in close touch.

As the boat approached the shores of Mackinac

Meanwhile, a large number of motor boat engineers have intimated a wish to become members of the Society if it is possible to care for the standardization of certain special things used in motor boat construction. Consequently, it is suggested that the title of the Society be changed from "automobile" to "automotive" engineers; that the Society shall be managed by a board of fifteen directors, there being one president, one first vice-president and five second vice-presidents; the council

being enlarged correspondingly to include the new interests.

In order to change the constitution of the Society it is necessary to obtain the approval of the general meeting, then to circularize the information to all the members and take a final vote by letter ballot before the next semi-annual meeting, which in this case will take place in January.

This is the most important business done on the 1916 summer cruise. The only other business matters discussed besides those necessary amendments to the constitution for altering the name, were a new method for choosing the nominating committee and the creation of a new class of membership; both being accepted with but little discussion.

The subject of the constitution of the nominating committee came up at the January meeting, and the problems then appearing are now solved by a resolution that the nominating committee shall have a member appointed by each section, and three other members, no two of whom may be resident in any one sectional district.

The other motion made was to alter the constitution of the Society so as to include a new grade of membership known as the United Service Engineer. The qualifications necessary are the same as those for full membership in the Society, but the initiation is reduced to $10 and the annual dues to $5, without the privilege of voting. This is done in order to allow engineers in the United States army, navy and other departments whose work brings them into close touch with transportation problems, to enjoy the benefits of S. A. E. membership at a price which will coincide with the relatively low incomes of such engineers.

A professional session of the engineers on board the Noronic

Trip Brilliantly Successful

That the four day scheme is adopted for good, if indeed there is not a move to add yet another day next year, has been settled by the unanimous vote of those who took part in the cruise this year. The only fly in the ointment was the limited time available for discussion, and there was considerable regret that the full program of papers could not be covered, several being left over at the close of the meeting on Friday afternoon when within hailing distance of the dock. It would seem almost worth while to hold a session in Detroit, later on, to take up some of the papers again and discuss them more fully.

The papers committee did their work nobly. Never has so fine a collection been got together, never has so wide a field been covered.

Taking up the itinerary from the time of sailing from Mackinac Island on Tuesday afternoon; the first event was the entertainment features provided by the Pennsylvania and Cleveland sections. The former arranged with Henry Hess to give a lecture on color photography, and he held the convention salon crowded while picture after picture illustrating the newest of the arts was thrown on the screen. Apart from the artistic value, Mr. Hess showed that color micrographs were going to be of great value in metallurgy, showing many things that did not appear in monochrome.

Cleveland had an operatic entertainment to offer of an extremely high order of merit with songs and music of a quality seldom encountered off the concert platform.

Sports Enjoyed Greatly

All day Wednesday was spent at Killarney, a diminutive fishing island inhabited by some 250 Chippewa Indians. Fishing, athletic sports and an East vs. West baseball game were the main features of the day. At night the Detroit section produced a five-act melodrama which was universally voted one of the funniest performances ever put on the stage. It had very little to do with automobile trade matters but was just a farcical

rendering of the old-time drama in the most approved manner.

Thursday was to have contained a stop at Owen Sound in the afternoon, but the Noronic lay fogbound at Killarney all night and, on getting away about 9 o'clock Thursday morning, headed direct for Detroit. Practically every available moment of Thursday and Friday was filled with the reading and discussion of papers and Thursday evening the Metropolitan section produced a revue which, while shorter than the Detroit play, was quite as much appreciated. The "book" consisted almost entirely of trade jokes, mainly at the expense of the Detroit section membership which were greatly enjoyed by the latter.

Discussions Limited

With Detroit in sight on Friday afternoon it was found that quite a number of papers remained, for the reading of which no opportunity had offered. It appeared to be the general opinion that the papers committee had provided ample on the program for an extra day or more of professional sessions. Even to cover the papers which were discussed it was necessary to read them in abridged form, and the speakers in the discussions were limited to a very few minutes each. This meant that many of the papers were not discussed as fully as they would otherwise have been and obviously next year it will be essential to make some arrangements whereby two papers on quite different subjects can be read simultaneously in different parts of the ship. This was the original scheme on this occasion, but the lower deck accommodation, fitted up as a theater for the entertainments, had very inadequate lighting, making it distinctly unsuitable for a meeting held in the daytime.

One of the outstanding characteristics of the trip this year was the absence of any new special topics of paramount interest. Last year every few yards along the deck would be found small groups of engineers discussing the eight- and twelve-cylinder engine, or if this were not the subject of the conversation it would be light weight. This year the burning questions of 1915 seem to have been settled and no others have, as yet, quite taken their place.

Future of the Tractor

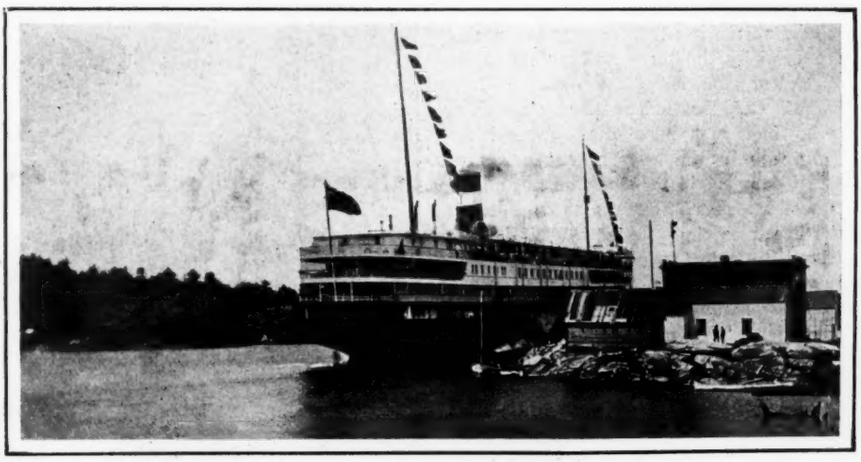
The future of the tractor is one of the most frequently discussed subjects, or rather the exact place which it is going to take in the automobile world. The general opinion is that there is a better market for a thoroughly well-made machine than for one which is merely cheap. Furthermore, that careful design and good workmanship mean economical operation which is really more important to the farmer than low first cost.

The pros and cons of differentials are also a subject to which some attention is being given, and it seems likely there will be a general move to try out some of the differential substitutes on a large scale in the 1917 cars.

Aeroplane Paper Provokes Big Discussion

Neil MacCoull opened the Thursday session with his paper on aeroplane engines, in which the recent developments are reviewed. Discussion on the paper was short as far as the original subject was concerned, but it opened up the question of the participation of the Society of Automobile Engineers in aeronautical work. G. M. Muffly said that the rotary type of motor, for which credit is generally given to foreign engineers, originated in this country in the old Adams-Farwell automobile. Rotary engines were equipped with double ignition on account of the belief that one set was apt to fail. What failures there were, however, were generally from the sooting of the plugs due to feeding too much oil.

"Aeroplane engines," continued Mr. Muffly, "are continually operating under racing conditions and hence care must be used in the speed for which they are designed, as they are run at full speed all the time. I also predict that rotary valves will be used to a greater extent and in fact am work-



The Noronic docked at Killarney, the Indian fishing village

ing on one now which will be distinctive in that it will be muffled.

"The advantage of twelve-cylinder motor installation is that it is possible to keep a constant torque and hence a constant speed on the propeller, thus reducing the tendency towards fluttering of the propeller. Where the rotary motor has fallen down is in the lack of economy of gasoline and oil. The reason for the great oil consumption is in the method of application of the oil and the greater clearances used with the steel pistons working in the steel cylinders.

"The rotary motors have also had a shorter life, which has been due to the attempts of the designers to secure abnormally light weight. Such a motor is naturally lighter than a reciprocating type and there is no necessity for cutting down life for the sake of the saving in weight. I prophecy that the new types of rotary will have higher efficiency and economy then the reciprocating engines."

Suggests Change of Society's Scope

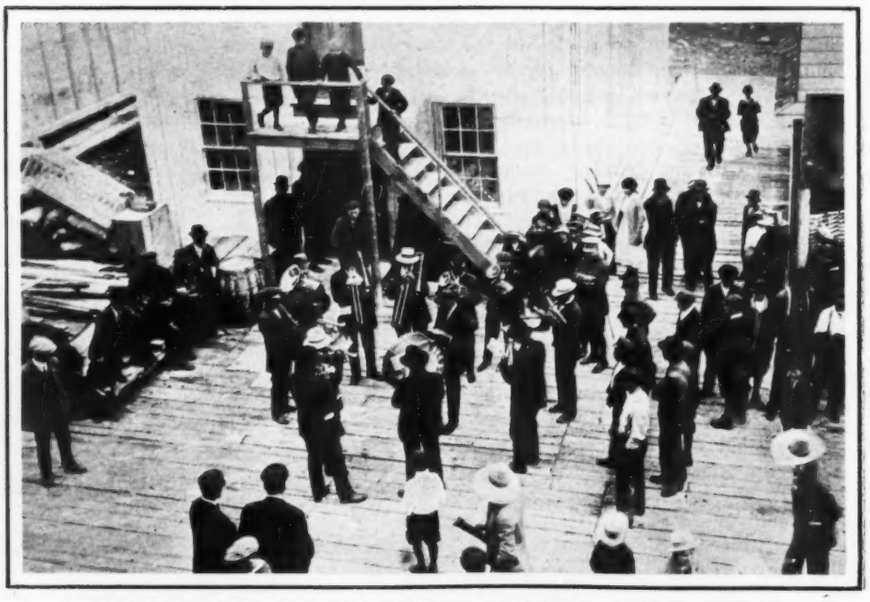
Howard E. Coffin then spoke upon the widening activities of the Society. He said that the organization was originally intended to go beyond its present scope. In fact if the definition of the word automobile is looked into closely it will be seen that it covers any mechanism which is self-propelling.

It is necessary that cognizance be taken of the labors in other fields—high-speed motor boats aircraft, both heavier and lighter than air; and the S. A. E. should make itself responsible for this development. The time has come, he explained, for the Society to make itself active in all lines that are really covered by the term automobile in its broadest sense.

Mr. Coffin called on Henry Souther, who has just been made consulting engineer in the government aeronautical service, to talk on the aeroplane question. Mr. Souther said there is so much to the subject that it is difficult to select the high spots. The art is changing so rapidly that every 2 months makes a vital difference in practice. "We must all get together to accomplish something," said Mr. Souther. "In years past there were restrictions between the governmental departments and the industry, but on the other hand, the engineering problems in connection with military work were very few and unimportant. Now they have been multiplied tremendously, therefore it has become necessary to remove the obstacles. A body of men has recently been formed, which reports only to the president; its title is the National Advisory Committee on Aeronautics. Some of the members are Dr. Walker of the Smithsonian Institute, Mr. Marvin of the weather bureau, and Dr. Stratton of the Bureau of Standards. Others comprise professors of important subjects from seats of learning and all operate in conjunction with several officers representing the army and navy.

"Last week a conference meeting was held and they brought together members representing the entire air industry, having a very illuminating discussion regarding the state of the art from the standpoint of the user, flyer and engineer. An active committee has been appointed to co-operate in carrying on the work. Dr. Dickenson represents the Bureau of Standards on the committee, Lieutenant Young the navy, and myself, the army.

"The whole course of action has been tentatively laid out. For the present the army and navy will be the principal users and must take the initiative and the first work of this sub-committee will be to draw up a set of specifications. The army, navy and Bureau of Standards will come to agreements on the specifications and these will be brought to the



The Indian band which met the Noronic at Killarney rendering a selection

attention of the engineering body most active in this work, and there is no reason why the S. A. E. should not be this.

"The standards committee of this body can then meet with the committee of the United Services, to clear up the specifications. These should be particularly valuable because they will be backed by the government departments and they should be developed rapidly.

Introduces "Automotive"

"Mr. Coffin has broached the subject of national alliance with bodies that are active in the motorboat, air machine and tractor fields. There seems to be no reason for hesitation. The name of the Society of Automobile Engineers has gone around the world and carries as much if not more weight in manufacturing circles than any other society I know, because it is a society whose work is practical.

"It is unfortunate that the word automobile, in the name of the society, is restricted by common usage to pleasure cars, but, if the name is restrictive, the difficulty is not insurmountable as some other word such as automotive could be used. If that were the only obstacle in the way of uniting the societies with common interests it could readily be overcome."

Howard Coffin then spoke of the importance of the air service abroad. He said that there were 30,000 men behind the lines training for positions as aviators. This is on the Western front alone, and does not include those who are already fighting. He said that Glen Curtiss had told him, in a recent conversation, that not one of the several thousand aeroplanes shipped to the other side by his concern has gone to the front, as it takes two weeks to get the latest practice and by the time they get to Europe they are fit only for school purposes.

"The object of Mr. Kettering's talk the other evening was to make us think, and this is the object of this talk on the subject of industrial preparedness."

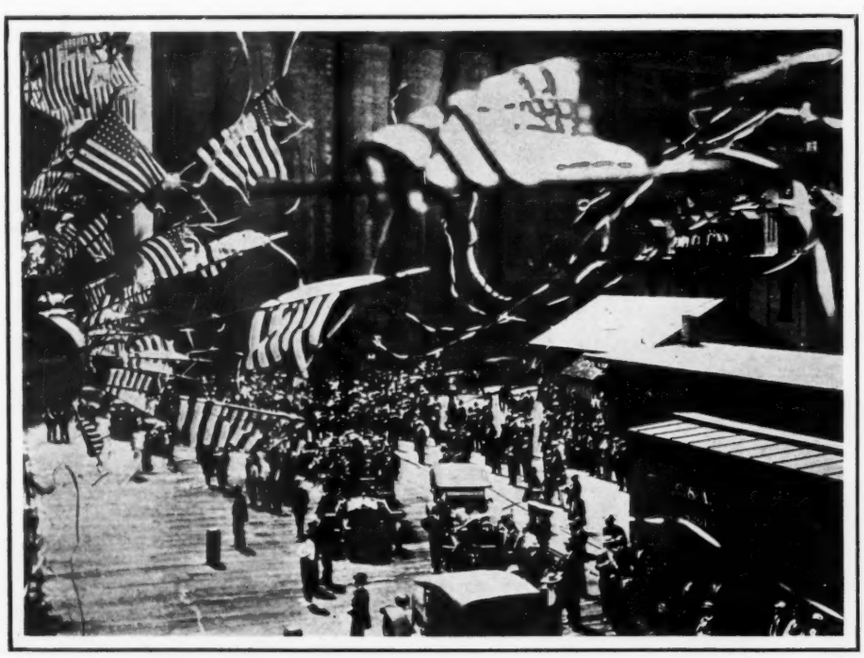
Mr. Coffin then read a large part of the address on industrial preparedness and the automobile industry which he made on May 29 at Indianapolis (reported in THE AUTOMOBILE for June 1).

Afternoon of Business

A. J. Slade's paper on Mechanical Transport Mobilization concluded the Thursday morning session and the afternoon was given to a meeting to accept the reports of the standards committee and to pass the constitutional amendments. The standards reports are printed on page 1116 and the details of the other business have already been mentioned.

On Friday, the ball was opened by B. Liebowitz with his paper, The Dynamics of Vehicle Suspensions. This is a lengthy treatise on the mathematics of springs and the principal speaker in the discussion was Henry Hess, who stated that a better suspension could be obtained from a single spring leaf backed by solid "cams" than from springs with multiple leaves. The paper in an abridged form will shortly be published in THE AUTOMOBILE, together with the scheme sketched by Mr. Hess.

Professor Lucke's paper, Kerosene versus Gasoline in Standard Automobile Engines, was digested by K. Zimmerscheid, Dr. Lucke not being on the boat, and this also is reserved for a future issue. Time did not permit much discussion, P. S. Tice speaking at some length, however, and promising to submit a written discussion on the subject, going fully into the points on which he differs.



Flags waved and excitement reigned as the Noronic left Detroit

Jacob E. Gramlich, Thermoid Rubber Co.

Herbert Chase, Automobile Club of America

Neil MacCoull, Westinghouse Mch. Co.

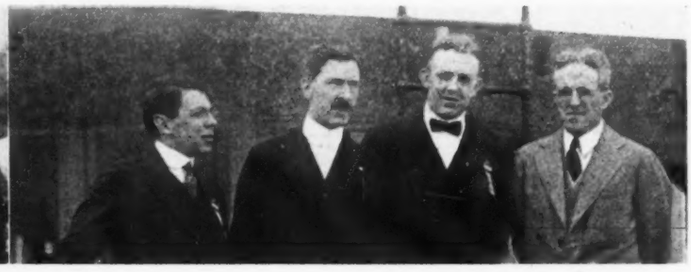
Alanson P. Brush, Brush Engineering Assn.

Arthur J. Slade, Consulting Engineer

Russell Huff, Dodge Bros.

V. W. Kliesrath, Bosch Magneto Co.

A. Schwalbach, Perlman Rim Corp.



W. H. Conant, Gould Storage Battery Co.

Henry G. McComb, General Motors Co.

F. E. Moskovics, Nordyke & Marmon Co.

Harry Fosdick, Wentworth-Fosdick Co.

W. A. Brush, Brush Engineering Assn.

George W. Dunham, Consulting Engineer

Henry G. McComb, General Vehicle Co.

A. B. Cumner, Autocar Co.

A. K. Brumbaugh, Autocar Co.

B. B. Bachman, Autocar Co.

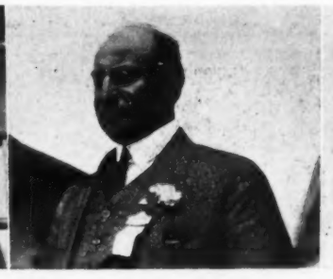
J. E. Schipper, THE AUTOMOBILE

Leonard Kebler, Ward Leonard Electric Co.

D. J. Burns, Ward Leonard Electric Co.

C. H. Foster, Gabriel Horn Mfg. Co.

Albert Champion, Champion Ignition Co.



Ernest E. Sweet, Cadillac Motor Car Co.

Arthur M. Laycock, Sheldon Axle & Spring Co.

E. W. Acker

G. P. Dorris, Dorris Motor Car Co.

J. G. Vincent, Packard Motor Car Co.

F. R. Hoyt, Wagner-Hoyt Electric Co.

George F. Walker, Royal Equipment Co.

A. Ludlow Clayden, THE AUTOMOBILE

K. W. Zimmerschied, General Motors Co.

C. F. Van Sicklen, Van Sicklen Co. John T. R. Bell, Norma Co. of America C. F. Scott, Sprague Electric Wks

Miss McCormack and Miss Cohn, S. A. E. Staff

R. M. Owen, R. M. Owen & Co. R. R. Owen, R. M. Owen & Co.

C. F. Kettering, Dayton Engineering Laboratories Co. R. H. Combs, Prest-O-Lite Co., Inc.

David Fergusson, Pierce-Arrow Motor Car Co. Alanson P. Brush, Brush Engineering Assn.

Representatives of the Splitdorf Electrical Co. Left to Right—Top Row—E. R. Hodges, A. D. T. Libby, W. J. McIntyre. Bottom Row—V. A. Nielson, H. W. Scholl

Willard Storage Battery Co. Men. Left to Right—Top Row—C. S. Whitney, E. M. Coe and H. S. Gardner. Bottom Row—A. J. Nightingale and A. C. Hyser

Above—The winning baseball team representing the East which defeated the Western aggregation 15 to 2 at Mackinac Island
Below—Staff of the S. A. E. Daily, produced on Noronic
Above Right—The Perfection Spring Co. Aggregation. Left to Right—Top Row—J. G. Utz, A. C. Bergmann, H. H. Newsom, W. P. Culver and W. E. Dunston. Bottom Row—H. E. Figgie, R. H. Brown, C. S. Pelton, F. A. Cornell, C. E. Clemens and C. W. Hatch.
Below Right—A group of tire men. Left to Right—J. T. Kennedy, Goodyear; G. A. Dodge, Dayton Rubber; J. H. Waysenhorst, Goodrich; G. F. Fisher, United States; W. A. Allen, Goodrich; C. C. Carlton, Firestone; C. J. Welsh, United States; J. E. Hale, Goodyear; and H. J. Palmer, Goodyear

Standards Divisions Report Progress

Standard Nomenclature Now a Fact—Several New Standards Accepted—Electrical Equipment Division Has Majority of Recommendations Ready—Standard Piston Ring Grooves Accepted

AT the opening of the session devoted to receiving the reports of the standards committee which took place Thursday afternoon, the chairman, A. Ludlow Clayden read the condensed report of the work of the past 6 months which follows:

On this occasion, the standards committee has but a few things which it asks you to accept as recommended standard practice. The divisions of the committee have been extremely active and we have some excellent progress reports to lay before you. I am going to ask you to regard the few reports presented for acceptance as a tribute to the thoroughness of my predecessor. Mr. Zimmerschied saw to it that before he relinquished the reins of office he had practically everything cleaned up.

At the end of February there was some reorganization of the standards committee; several committees whose work seemed to be at an end or who were for other reasons inactive were discontinued.

Recently, within the last 2 weeks, a new division has been created, and in the light of the interest which the society is certainly going to take in aviation and also possibly in motor boat engineering, it is probable that still more divisions will be added.

I wish briefly to review the work of the different divisions since the January meeting in New York. Taking them in order, the Ball and Roller Bearing Division has followed out its original plan and prepared a suggested series of standard sizes for taper roller bearings. Certain matters relating to ball thrust bearings are now under consideration.

Carbureter Fittings

The Carbureter Fittings Division has arrived at the stage when the bulk of its work appears to be done, at least for the present, whatever may happen in the future. The division has been engaged in the consideration of various details, such as throttle lever throw and threads on the rod ends. Various matters in connection with gasoline and other pipe sizes are also under consideration. Similarly the double outlet carbureter used for V engines will offer opportunities when it is certain that a definite practice can be recommended without in any way restricting the development of design.

The work of the Chain Division has been interfered with to some extent by the war, since the co-operation of the foreign manufacturers is sought to aid the division's endeavor to standardize dimensions so that chains of different kinds can be used on the same sprockets with equal success. In this connection, F. L. Morse, chairman of the division and president of the Morse Chain Co., has offered to allow other companies to use one of his patents if this assists standardization.

Electrical Equipment

The Electrical Equipment Division has been the most active this year. It has before it some of the most difficult questions which have yet been offered to the standards committee for settlement and the progress which it has made is excellent. At the present time it has two main objectives; one is to lay down some really scientific rules for the construction of lamps which shall give the right sort of light. A sub-committee of the division has been conducting actual tests of a very careful kind, and in a very short time it will be possible to recommend specific dimensions for the different parts of a headlight which will give a light strong enough for safe driving, yet so disposed as to overcome glare.

Another sub-committee of this division is dealing with the other difficult subject of starting motor generator and ignition unit standardization. Here the situation is as follows:

The aparatus is in course of development. It is admitted by everyone that electrical equipment is a long way from being in final form. This makes standardization difficult because it is not easy to be sure of the shape, size or disposition of generators and starting motors, say 2 years hence. Simultaneously, we see a great number of needless patterns being made to suit the idiosyncracies of various engineers. There may be excellent scientific and engineering reasons for a generator maker to have seven or eight patterns, but there can

Standards Recommendations

Nomenclature for all parts of an automobile. Standard Words accepted for chassis and body parts.

Standard sizes for flexible metallic tubing from 3/16 in. to 1 in. inside diameter, inclusive.

Three standard forked type lamp brackets of 7¼, 8¼ and 9¼ in. span.

Resolution that head lamps should be mounted at least 3 ft. from the ground, measuring to the center of the lamp.

Resolution that dimming devices which operate by reducing the current to the head lamp bulbs are of no value FOR THE PURPOSE OF ELIMINATING GLARE.

Resolution that focussing devices should not revolve the bulb nor cause it to move out of center.

Resolution that the slots in the bulb socket should be set so that the pins on the bulb stand vertical.

Resolution that bulbs for use with three cell batteries shall be known as 7 volt bulbs, and those for six cell batteries as 14 volt bulbs.

Resolution that the storage battery should be grounded by only one conductor and that the switch for the starting motor should be placed on the ungrounded side between battery and motor.

Standard throttle lever rod end to be 3/16 for carbureters from ½ to 1 in. and ¼ for larger sizes.

Carbureter throttle lever throw to be 1¼ for ½, ⅝ and ¾ in. carbureters, 1¾ for 1 to 2 in. carbureters inclusive, and 2½ for larger sizes.

Standard charging plug receptacles for electric vehicles.

A new high carbon nickel steel.

New table of physical properties of sundry S. A. E. steels, and some new recommendations relating to test specimens.

Formula and table of standard sizes for piston ring grooves covering every size of piston used in automobiles.

Increase of ¼ in. in the length of thread on the standard S. A. E. bolts.

Series of standard sizes for taper roller bearings making for interchangeability and following the previously accepted standards for ball bearings.

be no possible sense in making seventy or eighty differing from each other by very small degrees. It is the hope of the division to be able to strike some sort of happy mean between a standardization which might cramp development and the present chaos.

The division is also dealing with a number of matters of detail such as standardization of flexible metallic tubing, of tail lamp glasses, of headlight brackets, etc.

Electric Vehicle

The principal matter before the Electric Vehicle Division is the evolution of some scheme whereby vehicle batteries of different makes may be readily interchangeable, thus facilitating the running of fleets of electric trucks. The basis of such a standardization is to be found in the jars of which the battery is composed. These are made in a great variety of sizes, and many matters of scientific correctness of design have to be agreed upon in addition to the questions raised by the equipment with which different manufacturers are now working. The division has been investigating the subject very thoroughly, as it is felt that hasty action would probably be disregarded and that it is only of use to establish standards when there is a reasonable hope that they will be respected.

Engine and Transmission

The Engine and Transmission Division is paying close attention to the work of the Electrical Equipment Division with respect to starting motors and generators. The subcommittee appointed to deal with this subject contains members from both the electric equipment and engine and transmission division. The compilation and comparison of engine characteristic curves commenced last year is progressing. Arrangements have been made for elaborate tests of V belts, for driving fans, etc., and there are sundry other matters upon which action may be expected during the fall.

Foreign Co-operation

The Foreign Co-operation Division has found its work brought to a standstill by international conditions. At the commencement of its activity early in 1915 such correspondence was conducted with England and the outlook was very promising. Since that time the British engineering standards committee has had its personnel almost entirely absorbed by other work and consequently no committee can be got together on the other side and nothing can very well be done. There is no doubt, however, but that progress will be rapid as soon as the tension eases.

Miscellaneous

The Miscellaneous Division has always an extremely lengthy program. At the present time there are some fifteen or sixteen items before it. A recent attempt to standardize fittings for the attachment of the speedometer drive to the transmission has had to be abandoned owing to the extremely wide variations in practice discovered. It may be remarked that this type of standardization which seems so easy at the outset is really one of the most difficult and the explanation to my mind is that there is no fundamental reason why a speedometer should be driven in any particular way. There are a number of methods, each equally good, and the gain in selecting one of them for universal adoption is scarcely great enough to make it worth while at the present time for automobile manufacturers to depart from their pet ideas.

This division offers for your consideration a suggested series of piston ring standards, these being based upon both theory and practice insomuch as an empirical formula has been worked out which appears to give good results.

Another item before this division which may be mentioned as indicating the ever-growing character of the work of the standards committee is the additions which are suggested through the S. A. E. standard yokes and rod ends. This, one of the earliest S. A. E. standards, has been found to require extension in order to cover the sizes necessary for truck work.

Nomenclature

The Nomenclature Division has been something of an experiment in that its procedure has not followed the regular rules of the standards committee until quite recently. The idea of selecting standard names for readily recognizable parts of an automobile chassis is an old one and several attempts were made to bring it to fruition. A meeting was called in Detroit last summer at which a number of service men, not necessarily members of the society, were asked to be present and a start was made. Since then there have been many informal meetings and, finally, a sufficient number of members were appointed to make a division of the standards committee in accordance with the constitution of the society.

Within the year the whole chassis has been covered from end to end, owing to the strenuous labors of Mr. Zimmerschied and the recorder, A. C. Woodbury. To these two gentlemen the thanks of the whole world is due.

In his paper on the use of automobiles in the great war, which will be read on board the Noronic, the author comments on the fact that endless confusion has been caused through different American manufacturers adopting different nomenclature for the main portions of their trucks. I know from personal experience that in the early weeks of the war the confusion in the spare parts department at Aldershot was indescribable. This means that the amount of time wasted by manufacturers, dealers and users of automobiles through lack of clearness regarding the meaning of any particular name, must in a year total up to a sum of staggering magnitude. The list of names which the division has compiled does not include every small detail. Obviously such things as the internal parts of a carbureter must have different names depending upon the details of its design, but the list covers the vast majority of the parts which go to making a complete machine.

I would wish to lay stress upon the fact that many of the names chosen are debatable. Doubtless many of you who see this list for the first time will feel disposed to ask the wisdom of choosing such and such a particular word to describe a particular part. I have personally been able to attend a number of the meetings and have no hesitation in saying that not a single one was chosen without the most careful consideration of many alternatives. When the work was commenced it appears that it might take years to complete. By the end of the second meeting it was obvious that a generous give and take would bring matters to a speedy conclusion and it has indeed done so. It is suggested that the list submitted and the method of grouping the different parts should be followed by automobile manufacturers as completely as possible, and we have the support of many of the most powerful firms. I think it is quite probable that in years to come this list of names will show up as one of the most important and valuable things for which the S. A. E. has ever been responsible.

Research

The Research Division has been occupied exclusively with the elaboration of a test which will show the ability, economy; in fact, the all-around efficiency of a car taking the word efficiency in the widest sense possible.

At the January meeting this division submitted a suggested form for a fuel economy test. This was not accepted, owing to the fact that the standards committee considered the conditions were insufficiently rigid. Consequently, the division arranged a far more elaborate test from which it would scarcely be possible to read false conclusions. This was sub-

(*Continued on page* 1145)

Constant Pressure Cycle Possibilities—II

Further Advantages of Constant Pressure Cycle—No Starter Required—Description of a Proposed Engine

By Arthur B. Browne
Consulting Engineer
and Herbert Chase
Chief Engineer, Automobile Club of America

THE first installment of this paper, which was read at the Summer meeting of the Society of Automobile Engineers during the cruise on the SS. Noronic, June 12 to 16, appeared in part in THE AUTOMOBILE for June 15. The balance of the abstract of the paper follows:

Excellent Scavenging Properties

4—The scavenging in a four-stroke constant volume engine is never complete because of the large clearance space required. This results in several drawbacks, among which is a loss in volumetric efficiency and a dilution of the incoming charge with inert gases. These faults are not present in constant pressure engines, because an excess of air can be forced through the cylinder while the piston is at or near the lower dead-center.

5—*Volumetric Efficiency.* In the constant pressure engine using the working cylinder for a compressor, losses from decreased volumetric efficiency are precluded by the nature of the cycle. The air that may be normally pumped is in excess of the requirements of the working stroke on account of the subsequent expansion by heat. Hence there is always an excess of compressed air from which to draw on the working stroke. The piston cannot move until the volume behind it is sufficient to afford the necessary pressure. For peak loads the normal maximum pressure can even be temporarily increased, so that volumetric losses do not exist. This is in marked contrast to the constant volume cycle, in which the volumetric efficiency is not high, even at low speeds, and usually decreases as the speed increases.

Operation on the Two-Stroke Cycle

6—Constant pressure engines will operate much more satisfactorily on the two-stroke cycle than will engines of the constant volume cycle, because scavenging in the former can be more nearly perfect, through the use of an excess of air to remove the products of combustion, whereas unless fuel injection with its inherent difficulties is resorted to, engines of the constant volume two-stroke type must depend upon the incoming charge to scavenge the combustion chamber. This inevitably results in a loss of fuel. Under these circumstances not only is a four-stroke cycle unnecessary in a constant pressure engine but all the advantages of the two-stroke cycle without any of its disadvantages are realized. The four-stroke cycle with its two idle strokes is an engineering anomaly that need be no longer tolerated when the constant pressure cycle is employed.

Low Operating Temperatures

7—The specific heat of air at constant pressure is 0.2375, while at constant volume it is 0.1689. If a given weight of fuel containing a certain number of heat units be mixed with a sufficient weight of air for complete combustion, and the fuel ignited, the temperature attained will be much higher if heating takes place at constant volume than if the volume be allowed to increase at such a rate as to hold the pressure constant, although the work that can be done in either case is the same since the energy liberated is the same in both cases. In practice, however, it is probable that the longer continuance of the lower temperature of the constant pressure cycle will offset the higher temperatures of short duration and the greater flame-swept area in the constant volume cycle so that the heat losses through the cylinder walls will be approximately the same. The temperature of the exhaust gases in the constant volume engine will also be higher at the same exhaust pressures and this will represent a greater *total* heat loss than that in the constant pressure engine.

No Fuel Injection Pump Necessary

8—The operation of engines of the constant pressure cycle is not dependent upon any fuel injection pump as is that of engines of the Diesel and semi-Diesel type. Aside from the purely mechanical difficulties and complications of such pumps, the metering of the fuel for varying loads presents some exceptional difficulties, especially in small units. From all such difficulties the constant pressure engine is free, an advantage worthy of special mention in comparing the strictly constant pressure engine with one of the Diesel or semi-Diesel type.

No Starter Necessary

9—In practically all types of Diesel engines some form of high compression air starter is necessary on account of the high compression pressures attained. No such complication is necessary in the constant pressure engine. A small quantity of air under a pressure of perhaps 1 to 5 lb. will be sufficient to start the engine. When once started the engine will quickly pump air up to the predetermined maximum of the cycle and the pressure will then remain constant.

Combustion in the Constant Pressure Cycle

The constant pressure cycle comes closest to fulfilling all the conditions for efficient combustion. Combustion takes place under Class C conditions. It is highly efficient because: (a) The density of the charge is limited by structural considerations only; (b) It is possible to raise the temperature of the compressed air to a high degree, prior to the introduction of fuel, by utilizing the exhaust heat (which is commonly wasted); (c) The proper proportions of fuel and air can be automatically maintained without mechanical complications; (d) On account of the appreciable time that elapses between the entrance of the fuel and its final combustion, its complete vaporization and diffusion, even though it be of low grade, is assured by its introduction into the highly heated air, noted in (b) above, and (e). As was seen under heading of "scavenging properties" little if any dilution is due to presence of burnt gas in the mixture so that except for the presence of atmospheric nitrogen, which of course cannot be excluded, dilution is at a minimum.

Proposed Constant Pressure Engine

Cylinders *1*, Fig. 2, serve as both compression and working cylinders in which move the differential pistons *2*. Air first

enters the compression spaces *3* of the larger diameter of the pistons through pipe *4* on the in-stroke and is compressed on the out-stroke. This air need never be raised to more than 5 lb. pressure, and this may be accomplished by other means than a differential piston if more desirable. The air thus compressed serves to scavenge the adjacent cylinder, entering the latter via port *5*. The products of combustion leave the cylinder through port *6* (unless some other valve be provided in or near the cylinder head as a better means of exit). As the pistons move on the outward stroke, ports *5* and *6* are closed and the air remaining in the cylinders is compressed and discharged through the valves *7* into the receiver *8*.

Since the clearance space between piston and cylinder head is practically zero, substantially all the air is expelled on the outstroke. Just as the crank passes top-center the admission valve *9* is opened and the mixture is admitted to the burner through piping *10* (where its temperature has been raised by contact with the hot inner piping *11* through which the exhaust gas, discharged after the previous working strokes, has passed). The mixture, still under high pressure, passes into the burners *17*, which are in reality a part of the combustion spaces, as the pistons are forced downward. In the burners (the construction of which will be fully described later) ignition by spark from plugs *19* occurs and *complete combustion at constant pressure* ensues until the mixture is cut off as a result of closing the admission valves *9*.

During the admission period the heat gradually liberated as a result of combustion enables the products of combustion to expand *without loss of pressure* and thus do work on the piston. After cut-off the hot gases expand, with decreasing pressure, and continue to do work until the exhaust port opens. The burned gases, still at high temperature, then pass through the pipes *11* provided for this purpose, and give up to the walls of these pipes and the compressed air surrounding them a large portion of their heat before escaping to the atmosphere. Thus there is saved to the succeeding cycle much heat that would otherwise be entirely lost, as it is in most if not all other types of internal combustion engines. Furthermore, the addition of heat to the air in the piping *10* takes place *after* the air has been compressed. Thus its temperature is raised with corresponding increase in ability to do work.

Suppose now the compression pressure decided upon as most desirable be assumed, for the moment, to be 150 lb. Even at normal full load with cut-off at say one-third stroke it is evident that *all* the air compressed in the working cylinder cannot be utilized. Hence the pressure in the receiver will build up rapidly unless some relief valve be provided. To put this on the receiver would, of course, mean the loss of much of the work of compression. Hence a single unloading valve *15*, operated by piston *14*, is provided. When the pressure in the receiver rises above the 150 lb. desired, the valve *15* is forced open against its spring and the air in the cylinder is simply discharged to atmosphere with only slight loss of power.

If for any reason a momentary overload is to be carried by the engine some device such as *16* for increasing the tension on the spring that normally holds the unloading valve closed, can be brought into play. In the case of a motor car engine such a device could be operated by a simple dash control.

Fuel is supplied to the engine as follows: The pump *13*, positively driven from the engine, draws the fuel from the main supply tank and delivers it to the reservoir *18* in which a float or some other device maintains a constant level. Any surplus fuel pumped is by-passed or returned to the main supply tank. The small tank *18* is maintained at a pressure somewhat less than receiver pressure, depending upon the air velocity through the restricted area *22*. From this tank the fuel is drawn through the spray nozzle *12* by the injector action of the air passing the nozzle. The flow of fuel will of course cease immediately when the air flow ceases on account of the closure of the admission valves *9*. A correct proportioning of fuel to air may be accomplished by proper adjustment of the regulating valves *23* and *24*, Fig. 2. As the velocity through the atomizer *25* increases the natural tendency toward over-richness is counteracted by the proportionately diminished pressure in the restricted area at *22*.

The admission valves *9* can be made of the Corliss, slide or

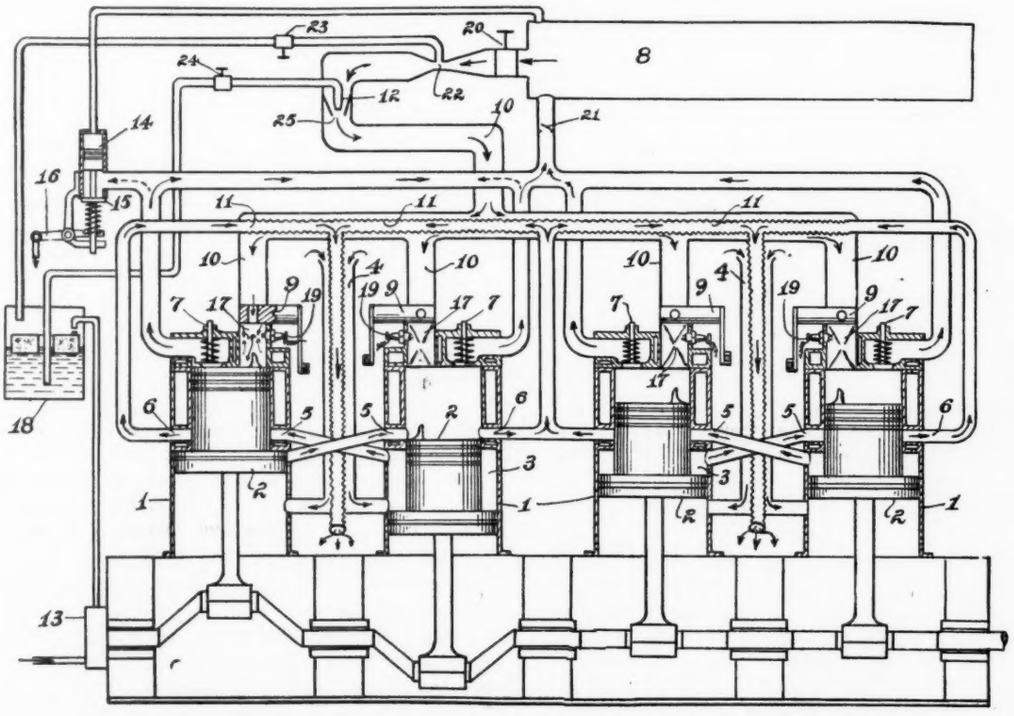


Fig. 2—Diagrammatic representation of four-cylinder engine operating on proposed cycle

poppet type, as proves most desirable, and be operated by any conventional cut-off device such as, for example, is used in steam engine practice. In the case of a motor car engine the point of cutoff would be varied by a device operated in precisely the same manner as is the throttle on an ordinary Otto cycle engine. The throttle valve *20* shown in Fig. 2 would be used only in starting.

The check valve *21* prevents air in the receiver escaping to atmosphere when unloading valve *15* is open. The admission valve can, if desired, be left open during practically full stroke when a heavy torque is required. The card would then be practically square and resemble closely a card from a steam pump. Under this condition the fuel consumption would of course be much increased because the gases would not be allowed to do work in expanding after cut-off. The periods when such a late cut-off might be used would be short in an engine properly proportioned to the load.

The striking similarity of the constant pressure cycle to that of a steam engine is at once apparent. But while the results are equal in every way to those accomplished with the steam engine, the engine is self-contained and does not require the boiler, condenser and other elaborate external apparatus necessary in the case of the steam engine. An engine operating on the proposed cycle has all the advantages of the steam engine without any of its disadvantages and at the same time possesses characteristics that should render it much more efficient and practicable for motor vehicles and many other types of service than is any type of internal combustion engine now in use.

Description of the Burner

The operation of the proposed cycle is dependent to a large extent upon the functioning of the burner marked *17* in Fig. 2 and shown in detail in Fig. 3. To understand the operation of this burner it is necessary first to have clearly in mind certain fundamental laws governing flame propagation. Imagine a tube composed of material that is a nonconductor of heat, this tube being closed at one end and open to atmosphere at the other. Now suppose the tube be filled with a highly combustible mixture of air and gas. If the mixture be ignited near the open end of the tube the flame will travel toward the closed end at a rate of speed dependent chiefly on the quality, temperature and pressure of the mixture.

Suppose now a vessel containing a combustible mixture under pressure be connected to the open end of the tube. If the end of the tube formerly closed is then opened the combustible gas in the vessel will flow out through the tube at a rate dependent upon the pressure. If now the mixture be ignited at a point midway of the tube the flame will propagate itself either toward the vessel or away from it according to the relation between the velocity of the gas and the rate of flame propagation. If the rate of flame propagation be greater than the velocity of the gas through the tube the flame will travel against the flow of the gas and ultimately enter the vessel from which the mixture is issuing. If the velocity of the gas is greater than the rate of flame propagation the flame will travel with the flow of gas and ultimately blow out at or near the open end of the tube. If, however, the rate of flame propagation is equal to the velocity of the gas the flame cap will remain stationary, the combustible gas approaching it from one side and the products of combustion leaving on the other.

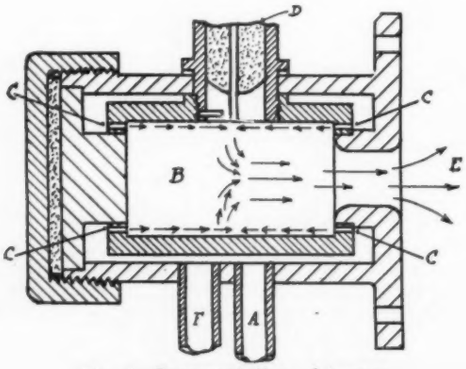


Fig. 3—Representation of burner

In the case of the burner shown in Fig. 3 the combustible mixture enters under pressure through the pipe *A* and fills the annulus (called the diffusion chamber) surrounding the combustion chamber *B*. Entrance to the latter is afforded by openings *C* so arranged that the streams of gas come from opposite directions and meet at a point where their velocity is zero. The velocity at the point of entrance to the combustion chamber of the burner will depend upon the pressure difference between the combustion chamber and the chamber from which the gas issues. Suppose now the pressure difference is such that the velocity at the point of entrance is 100 ft. a second and that the rate of flame propagation in the particular mixture under consideration is 50 ft. a second. If the gas be ignited by spark plug *D* after entering the combustion chamber, the flame cap will travel against the gas current until it reaches a point where the velocity is the same as the rate of flame propagation, in this case, 50 ft. a second.

Such a point must exist between the point where the velocity of the gases is zero and the point of entrance. Otherwise the flame will travel through the opening through which the gas is entering, and ignite the mixture approaching the burner. To confine the flame within the burner it is therefore necessary at all times to maintain at the point of entrance a velocity higher than that of the flame propagation. This will result in maintaining the flame within the burner and the products of combustion will issue from the outlet *E* of its combustion chamber.

In practical application of the burner already made it has been found that the burner can be operated over a wide range of pressure differences without adjustment and it has also been found possible to use the burner with the heaviest and cheapest grades of oil obtainable and still secure complete combustion, at least so far as the eye and nose can detect.

Heating the Air

In case liquid fuel of low volatility is used it is of course necessary to heat the air in which the fuel is mixed and see that the latter is finely divided. In practice this is done as follows:

The air, passing through the atomizing device *25*, Fig. 2, becomes impregnated with fuel mist and is immediately conducted through tubes where its temperature is raised by contact with the hot walls of the inner tubes *11*, carrying exhaust gases. This exhaust heating at constant pressure, not only effects the material increase in efficiency already noted, but serves to make a fixed gas of the mixture, which may thereafter be safely conducted to the point of combustion without fear of condensation. With gasoline this fixation is unnecessary. Hence a ready means for starting a cold engine is available.

In applying the burner to an engine it is necessary simply to see that the conditions outlined for properly mixing and volatilizing the fuel are met. If the temperature of the air passing the nozzle *10*, Fig. 2, is sufficiently high to cause immediate ignition of the fuel, two alternatives are open. The first is to maintain a velocity in the mixing chamber that is always greater than the rate of flame propagation in the mixture. The second is to make provision as by valves *23* and *24*, Fig. 2, whereby the mixture while on its way to the burner is too rich to ignite, that is, until suf-

ficient air entering through auxiliary inlet *F*, Fig. 3, is added to this over-rich mixture in the space surrounding the combustion chamber so as to secure complete combustion.

The degree of rapidity at which the heat is liberated in the burner is indicated by the fact that it has been found possible in tests already made to melt a bar of steel inserted in a burner made of brass. The design of the burner is such that the gases entering insulate the walls so that the latter remain comparatively cool.

High-Lights of the Discussion

HIRAM PERCY MAXIM:—In the opinion of the writer, the Society is to be congratulated upon having a paper on the Constant Pressure Cycle at this time. When the Otto cycle engine is offered in units having no less than twelve separate cylinders, such as our modern twin sixes, the question of casting about for a better cycle becomes a matter of necessity.

Engineers look at this question of a better cycle than the Otto in two different lights. Those of us who must design and build something this month, which can be sold next month, with 2 per cent for cash in 10 days, one of the very important factors, regard anything other than the Otto cycle as partaking of the fanciful or hare-brained. On the other hand, those of us who are not actually dependent upon the immediate sale of the design are keenly interested in anything which promises better thermal efficiency than the Otto cycle. They even date the obloquy of their associates to the extent of going back as far as the old Brayton engine, which we all studied when we first bought all the gas engine books. This is just what Messrs. Browne and Chase have done, and they are to be complimented for their courage.

The writer frankly states that he belongs in the same group as Messrs. Browne and Chase. He had an active part in the early development of the gasoline engine, and is one of those who are not yet over wondering that it works as well as it does. Its status in his mind is anything but that it is the final type of engine. Rather than this, the writer feels that the Otto cycle engine has succeeded in spite of, and not on account of, its principles.

The tremendous losses at the exhaust, the losses due to the adulteration of the fresh charge of the large quantity of burned gas from the previous charge and those resulting from ignition at lowered compression, as when running throttled, cannot long go on. The only way we can admit them is by having no other alternative. But this only places a premium upon developing an alternative, and this is just what Messrs. Browne and Chase are trying to do. They present the diagram of a reciprocating engine in which the explosive mixture is burned in the new flameless burner which Dr. Lucke has told us about in the past, instead of being burned on a gauze, as was done by Brayton.

A Continuous Rotary Design

The losses in the principle laid down in the diagram shown by Messre. Browne and Chase, would be undoubtedly very much less than the losses in the Otto principle, and the writer has no comment to make upon the analysis of these losses which is given. He believes, however, that the authors go only part way when they pick up the old constant pressure cycle and apply it to a multiple-cylinder reciprocating engine.

Answer to Mr. Maxim

HERBERT CHASE:—We heartily agree to most that Mr. Maxim says in his discussion. The possible development of a turbine operating on the constant pressure cycle has long been predicted. By utilizing the burner described in the paper such a turbine can doubtless be made to operate, providing the problems involved in cooling can be solved. The chief obstacle seems to be that of compressing the air necessary for combustion of the gas. We hear that some moderately efficient rotary air compressors have been developed in France, but I have yet to lay hands on any thoroughly reliable data regarding these. Of course if a reciprocating compressor must be employed there would seem to be no object in using a turbine in which to do the work of the cycle, since this may be done to better advantage in the compressor cylinder exactly as shown in the paper. Granting, however, that an efficient turbine will be developed, it does not follow by any means that it will replace engines of the reciprocating type. Witness conditions in the steam engine field, where in the smaller units the reciprocating type is not only more efficient but is more readily adaptable to most conditions of service. Unfortunately the turbine, whether steam or gasoline, is essentially a high-speed machine. On this account its application to motor vehicle service where comparatively slow speeds and high torques are ultimately required is no simple problem and it is by no means certain that even a highly efficient gas turbine will, if developed, replace the reciprocating engine for this class of work.

Smith Suggests Use of Fan

GEORGE W. SMITH, Thos. B. Jeffery Co.:—I believe it possible for you to throttle the intake of pipe 4 as shown in Fig. 2, in such a way that you can regulate the amount of air drawn in in direct proportion to the amount of air injected into the cylinders during combustion. There would be a slight saving in power in so doing but the principal advantage, I think, would consist in eliminating the noise of the exhaust that might result from ejecting the air past regulating valve 15. I have also considered the advisability of a multiple sirocco type of fan in place of the truncated piston as shown in Fig. 2. The fan would lend itself very readily to the varying requirements of the engine in regard to volume of free air at the different speeds, and I believe possesses sufficient merit to be considered at least in the discussion.

Wilkinson Doubts Engine's Efficiency

JOHN WILKINSON, H. H. Franklin Mfg. Co.:—I have always been very much interested in possibilities of the constant pressure cycle. First, because I was familiar with the old Brayton engine which was used at Cornell University for many years. While I never remember seeing it running, it was a very familiar sight in the days when I attended the university. Secondly, in 1900, I attempted to build an engine of this type. It was not any sort of a success, principally, I think, because we were not able to handle the ignition question satisfactorily at anything except very low speeds. Also, most of us remember the efforts of the Association of Licensed Automobile Manufacturers in connection with the Selden patent to build an engine of this type which would run. Many thousands of dollars were spent and it would be interesting to get the experience of the men who worked on this development.

There should be nothing inherently difficult about producing a satisfactory engine of this type, although doubtless some inventive ability will have to be displayed for some of the features.

I very much doubt the statement that the theoretical efficiency of this engine is as high as 84 per cent. In fact, as used under full load in an automobile I doubt if the efficiency would be as high as in our present engines, although perhaps it would be considerably higher at the light loads.

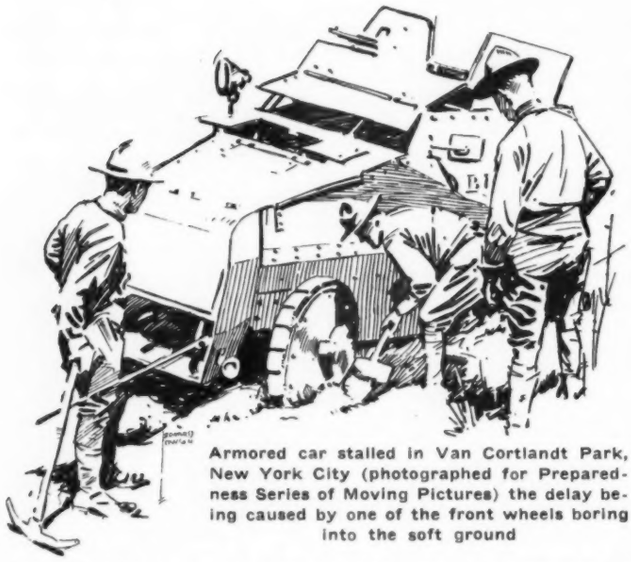
Answer to Professor Diederichs of Cornell

HERBERT CHASE:—We of course realize that it is exceedingly difficult to predict just what the thermal efficiency of the proposed engine will be. We fail to see, however, why the mechanical efficiency should be much, if any, lower than that of an Otto cycle engine. We believe that the thermal efficiency should be a good bit higher partly because higher compression pressures and better conditions of combustion prevail, and partly because a good bit of the heat which ordinarily would go out with the exhaust is utilized.

The Search for the Army Truck Wheel

The Composite Type of Wheel (1) as Front and Trailer Wheel, (2) as Driving Wheel—An Examination of Its Possibilities

By Marius C. Krarup



Armored car stalled in Van Cortlandt Park, New York City (photographed for Preparedness Series of Moving Pictures) the delay being caused by one of the front wheels boring into the soft ground

LESSONS from war service with regard to automobiles and motor trucks emphasize traction troubles and troubles due to injury from bullets and shells. They are probably usually accepted with a large grain of reservation as to their importance for average civilian motor vehicles. But it is realized that, aside from the need of guarding against projectiles, the military requirements are after all little more than civilian requirements for very rough and variable service. Ability to get from one place to another with maximum load, with regularity and without injury to the vehicle, rapidly if roads are good and less rapidly, but still reliably, where roads are bad or don't exist—covers in general terms what is wanted for the hardest kind of commercial work as well as for war. But only few vehicles need to measure up to these requirements under peace conditions, while all war vehicles should do so to the last letter.

One of the main questions with regard to the possibility of fitting a large number of ordinary automobiles and commercial motor trucks for military work on very short notice, therefore takes the form: Can the ordinary motor vehicle by some simple change in its equipment be made fit for operation under the most adverse road conditions, while still retaining its suitability for the easier, but much faster, service on fair roads?

Naturally, the first thought in this connection is aimed at improvement of the driving wheels. If a type of wheel having the desired effects may be devised and may be substituted for the type of wheel ordinarily used, it might be called the Wheel of Preparedness, to fall in line with the current phrase. But even simpler means are tried.

The use of traction chains on the wheels is the most obvious and convenient provision of this nature, but according to all reports from the war correspondents, it is of small benefit with heavy loads on soft ground or snow, and does not prevent a vehicle from being mired, while on rough and hard roads the chains wear out too rapidly. Their advantages are insufficient for military work. The large, pivoted traction blocks, on the other hand, with which ordnance and heavy tractor wheels are equipped, reduce the speed on fair roads unduly. The differential lock is useful and helps out in combination with the traction chains, but of course only if the difficulty does not apply to both driving wheels. With regard to the special wheels said to be used on Italian trucks, the reports which have been published have not been explicit, but these wheels seem to be mainly designed with a view to securing traction on hard but slippery mountain roads at low speed.

In addition to these efforts for improving traction, front wheels have been arranged with enlarged surfaces, in various forms, to prevent them from sinking into soft ground, and the principal objection to this provision lies in poor steering and inconvenience of the attachments, while it can also not be combined suitably with armoring of the vehicle.

On the whole, little has been done to make the front wheels pass over obstructions and over soft ground in such a manner as to help in reducing the traction work to be done by the driving wheels, excepting only the four-wheel drive and steering system, which however represents a complication not required for the majority of commercial motor vehicles, and one which cannot be introduced offhand when these are to be used for military or other emergency work.

With all these considerations in mind, the advantages of a wheel construction based on the principle shown in Figs. 1 and 2 seem to be so pronounced as to suggest that it should be tried out, especially where war is in progress or preparedness for war under discussion. The bearings of the hub, the drive and the means used for locking the wheel on the axle, and holding the components together, are omitted, as they can be anything desired and customary.

The construction is merely an improved form of the compound or composite wheel in which the vehicle wheel proper rolls upon a circular track formed as part of a separate road wheel, but it is so compacted that the whole wheel is not necessarily of larger diameter than an ordinary motor truck wheel, and its components are so aligned that no other relative movement is possible than the rolling movement of one component upon the other. The road wheel component rolls on the ground without tractive relations to the latter, whether the vehicle wheel component drives the road wheel component or only rolls on it. The large thrust bearings, (in conjunction with the customary means for holding the wheel on the axle) hold the components in lateral alignment but have little work to do, as the road wheel component has almost the same angular velocity as the vehicle wheel sheaves. The central device maintains constant contact between the components, so that the wheel must act as a unit on the roughest road.

The advantages of this construction for front wheels and trailer wheels are perhaps less important but also less subject to doubt than those relating to its use for driving wheels, and may therefore be referred to separately and first.

For Front Wheels

It may be said that the simplest manner of improving front wheels (to make them surmount obstacles more readily, make them less liable to sink into soft ground and more easily pushed out of a hole) is to make them larger, and

there can be no doubt that it always would be an advantage for driving on rough or soft ground to have the front wheels as large as proper regard for the steering permits, but any change in size, as compared with the front wheels of ordinary commercial vehicles would mean a higher front axle and a change in general design and lines of the vehicle. If sufficient to be of much value the change would be a radical one. The composite front wheel, on the other hand, can have the axle at the normal height with its road wheel component only 1½ to 2 in. higher than a normal wheel and extending only ¾-in. to 1-in. farther back than the normal wheel does at the middle portion which determines the sharpest possible steering angle. And it has some advantages which a considerably larger front wheel would not possess.

When a road obstacle is struck, the vehicle wheel with its loads runs forward and smoothly upward on its road wheel track and tips the road wheel over the obstacle without abrupt shock, the momentum of the vehicle assisting, and the components of the wheel adjust themselves afterward to their normal relations, in which the vehicle wheel is supported in the road wheel track slightly forward of its lowest point—somewhat more forward the faster the vehicle is moving and the lighter the front axle load is.

On soft ground there are two important considerations: To obviate the sinking of the wheel and to push it out if it is in a hole or is mired. When a front wheel of ordinary type begins to sink, the push from the rear axle is likely to aggravate the situation unless it is immediately effective. With the composite wheel the track on the road wheel component remains clear, and the vehicle wheel in moving forward on this track turns the road wheel over the danger spot by gradually increasing pressure from the load and without boring forward in the soil. The momentum of the load moving gradually upward on the track should be sufficient to turn the road wheel over even if the resistance is so great that the vehicle wheel finally strikes the track of the road wheel directly in front of the front axle and at dead center with the thrust from the rear axle; for at such a moment the lowest portion of the road wheel would be released from the vehicle load, and the momentum of the impact would only have to turn the weight of the road wheel component alone around the resisting front edge of the hole, whereafter the relations would at once be favorable for progressing.

The whole action can be easily perceived, though a complete description becomes lengthy and tiresome. Under all circumstances, on miry as well as on rough ground, all futile pushing of the wheel against the soil is minimized, being resolved into a gradual climbing of one wheel component in the other, thereby storing the propulsive power of the vehicle momentarily and making its accumulation assist in effecting rotation of the wheel and progress of the vehicle.

That a wheel of this type is naturally armored against rifle fire should mean a valuable weight reduction for the front of armored cars with machine guns, and, as dangerous stalling of such vehicles seems to be mostly ascribed to miring of the front wheels due to excessive front load, the advantage of the composite wheel type may in this respect be two-fold and important.

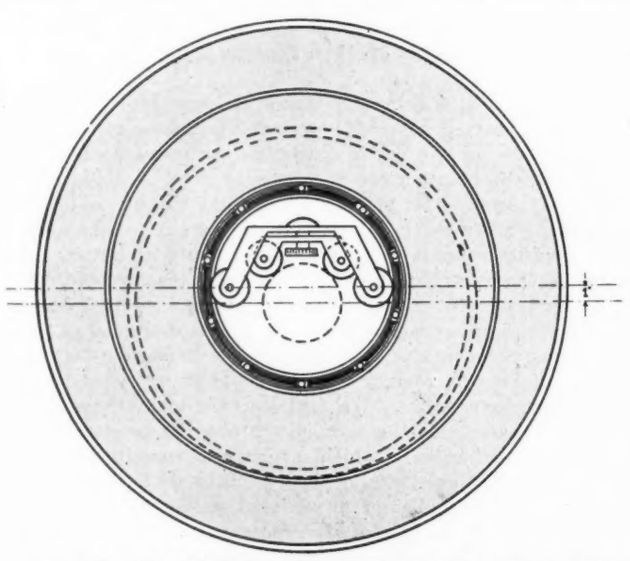
The type also offers an opportunity for doubling the cushion effect of solid rubber tires by having both the vehicle wheel component and the road wheel so shod, and this arrangement may permit dispensing with pneumatic tires in cases where these otherwise would be preferable. The vehicle wheel tires, being of small diameter and width and removed from contact with the road would be inexpensive and would perhaps protect the road wheel tire sufficiently to offset their own cost.

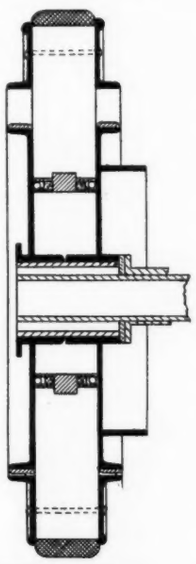
For Trailers

It is understood that the use of trailers for military transportation and hauling was practically discontinued in the European armies before the war began, mainly because the additional load which could be safely hauled by means of them was found to be greatly reduced by difficulties in starting them whenever they had been left standing for a short time on any ground not absolutely unimpregnable. The same objectionable feature naturally reduces the utility of trailers for commercial work. Springy couplings have not so far been found a sufficient or desirable remedy for this shortcoming, largely because they reduce the safety of the coupling on hills and at sharp stops, and any great increase in the diameter of the trailer wheel militates against a short turning radius, so much more as the trailer at a turn is pulled around on a shorter curve than the tractor unless special mechanism is installed to the contrary effect.

It seems evident, on the same principle as with regard to front wheels, that the composite wheel would reduce the power and traction requirements for starting the trailer over a considerable range of unfavorable conditions, the maximum within this range being always that needed for making the vehicle wheel travel over the gradually rising curve of its artificial track until it begins to slip. The change in the location of the load pressure must be sufficient to turn the road wheel over before the point of slippage is reached.

As the load cannot gravitate at any other than a certain rate, determined by the load, the resistance and the general laws of gravitation, and the tractor may not pull at a rate of progress agreeing exactly with this action, it is clear that some see-sawing may take place between the vehicle wheel component and its road wheel mate, but the start at all events can be effected if it can be begun,





Figs. 1 and 2—Diagrams showing principal features in wheels of composite type

Fig. 1—Side view of the middle or road wheel component with tracks and thrust bearings. Device for maintaining contact of wheel sheaves with the tracks is shown in the central circular opening. Relations to axle and hub carrying the wheel sheaves are indicated in dotted lines

Fig. 2—Vertical section of assembled wheel, with omission of hub details and the central device. Without brake drum the diagram would also represent front wheel construction approximately

while only experience can devise the best means for making the acceleration smooth and unobjectionable. In this respect the nature of the coupling between tractor and trailer may be important, since it might tend to suppress or accentuate irregular movements, according to its mode of uniting the two vehicles.

With due allowance for the uncertainties of this or similar nature that may be involved in the use of the composite wheel type for trailers, there does not seem to be room for doubting that it would increase the average and permissible load for this class of vehicles, partly through assisting in overcoming large starting resistances and partly through the same sort of action on rough or soft ground that makes it desirable for front wheels. As the relative movements of the wheel's component parts take place in the plane of the wheel, no appreciable effect on steering movements should result, except to make them safer in case an obstacle in the road tends to interfere with them.

Although the advantages of the type for front and trailer wheels always depend in part upon the vehicle wheel component assuming the functions of a driving wheel in relation to the road wheel component, the use of the type for driving wheel purposes nevertheless brings factors into play which must be considered separately. It will not function properly at high speed as a driving wheel, though as a front wheel it can operate at any desired speed, and it is necessary to figure out just how fast it can be operated as a driving wheel under given suppositions of loads, dimensions and resistances.

Another chapter must be devoted to this task.

(*To be continued*)

Paragraphs on Current Topics

By Marius C. Krarup

Motto: Radical Thought, Conservative Action

Invention of motor fuels has reached the popular stage. In addition to the Burton process used at S. O. refineries, the Rittman process acquired by the Government and already peddled out in licenses to about a score of concerns, and the Charles S. Palmer process which has just been announced as capable of putting gasoline—real gasoline—back to a cost of 9 cents and a sales price of 15 cents per gallon, three gentlemen of Greenville, South Carolina, have discovered a chemical by means of which three parts of kerosene mixed with one part of gasoline are made into just what the motorist wants. Frank Watson of Iowa has a water mixture at four cents per gallon which drives a Ford car 20.6 miles (note the decimal) without adjustment of the carbureter. There is also a promise that 85 million gallons of benzol will be thrown upon the market annually as soon as the war is over, at whatever price it will command. Charles Jason Greenstreet of Saint Louis, with three refineries at his command, has a "Gasoline Corporation" under way which will make gasoline from crude oil at one cent per gallon and from distillates at 4½ cents, thus being liable to get into an interesting competition with itself, than which there is nothing more stimulating, it is said. From the Indiana gas fields we hear that 1000 cubic feet of gas will yield five gallons of gasoline by compression and can yet be used afterward for fuel and light, and that three plants are being erected to take advantage of these practical arithmetics whose conflict with specific gravity figures is a detail. Hine Smith, a farmer of Sparta, Michigan, has an attachment to his motor which makes kerosene alone all right. Frank R. Blamey, a grain and feed dealer of Bloomfield, N. J., is on the same track as the South Carolina men, having found a chemical that makes a kerosene-gasoline mixture just the thing. T. S. Causey, of Dallas, Texas, has a "Thermal Generator" which utilizes the heat of the exhaust and, after starting on gasoline, makes crude oil an acceptable fuel.

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Turning from these more or less optimistic engineering projects to the latest batch of S. A. E. treatises, we find the possibilities of the constant pressure cycle for automobile motors confidently but carefully discussed by Arthur B. Browne and Herbert Chase and don't read very far before we have the proposed motor identified with everybody's dreams, and we have yet to make sure that the presumable flaws really exist in the conception of it which is here presented; the first one without apparent bias in any direction. It makes use of almost any hydrocarbon fuel, kills off the suction-carbureter and makes us understand that the reason why the vacuum gasoline feed system tarried so long in coming, though so nearly self-evident, was because all suspected, without exactly knowing why, that it might soon be superfluous. Anticipating things a trifle, it may be suggested that the new motor, when the time for baptismal rites arrives, shall be called neither the constant pressure cycle motor nor the carbureter-less motor, but something euphonious, such as the All-Fuel or the Browne-Chase. Meanwhile there is an alluring pastime in trying to specify the reasons why it will never come into existence. It is at least good enough to justify such an effort.

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Hush! The S. A. E. is going to change its name to S. A. E. with a different spelling for the A, or has already done so. The difference between Automobile and Automotive is nothing to speak of etymologically, both being hybrid words and both suggesting anything with "self" and "motion" in it, but in practice it means about 1000 more members, whereas it also confers with one stroke new capacities in aeroplane and motor boat engineering upon all the old merely automobile members. Just as before, however, each one will have to disprove or sustain the allegation by his own unaided activities. Societies have ceased to be endorsements. They are only opportunities. That is, they are worth more for the right man and less for the wrong one than they used to be.

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No sooner has the Society of Automobile Engineers finished the work of finding names for everything that anybody could possibly desire to mention in connection with automobiles and of sticking these authorized names on to stay, in the form of a long list soon to be published, than the Society of Automotive Engineers has to take up the same work for the added crafts and issue a new edition. It would only be fair to posterity—since posterity always suffers from too much nomenclature—to appoint a committee to conduct proper burial services, from time to time, over the words which fail to survive, dying from lack of red corpuscles or because enterprising inventors and designers introduce new realities which make them superfluous. We notice words which have been dead for years spooking around in new books and daily papers—and other ones which a properly constituted committee could kill quietly and bury publicly without anybody weeping. Oh, for a list of proscripted words with the next S. A. E. effort in the field of nomenclature! In the meantime, private lists of 50 to 100 useless automobile words are welcomed for an eventual bonfire in these columns.

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F. W. Lanchester studies the best proportions of streamline bodies, with sole reference to air resistance, in *Engineering* of May 19. When length is 5 or 6 times the diameter or more, exact shapes are unimportant, he finds, but with the

length relatively smaller "we get to a point at which streamline flow becomes unstable, and when this point is reached the resistance responds in an acutely sensitive manner to the slightest change of shape." And yet the racing cars with the longest tails have not always won.

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"The weight of the entire axle builds up around the driveshaft diameter," says H. D. Church with a happy turn in the phrasing, and this is his reason for keeping the shaft slender despite high stresses. "Also a good reason for taking the shaft out of the axle," comments the advocate of internal gear drive. Both are right, and so one is reminded that even the best reasoning has to make good in practice. Mr. Church has many another phrase in his S. A. E. paper which appeals to a broader public than the bulletin readers. For example, he has "never seen any grease cup having sufficient power to force grease into the loaded side of the bearing, even with no load on the truck," and he shows how oil can be made to do the work better than grease, as many truck owners need to know. The argument could also be used in favor of a graphite addition to the oil, since a little of the graphite will always get under the load.

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A few blossoms from Mr. Bradley's paper will also bear repetition as examples of expressive diction full of meaning in a few words. "Any military type of truck that can be developed," he writes, "is bound to be swamped by the thousands of purely commercial models that will have to be enrolled when the nation goes to war." And in another place: "A 3½-ton truck is not so light as to be constantly threatened with overloading," which makes us reflect again upon the peculiarity that the factor of safety with regard to overloading, though it is in the hands of the public, is so much smaller than the factor found advisable against stresses which can be closely calculated. Summing up war experience, Mr. Bradley also writes: "Brake rods should be regarded as organs needing protection" and "Engines under the seat will no longer be accepted" in the French army, omnibus chassis excepted. One may be inclined to quarrel about the latter conclusion, so long as the general truck type may yield to something better any day, but scarcely about the needed protection for brake rods, which may be hit by any board that is tripped up.

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From the same paper one gleans the idea of a new accessory of value for all hauling work that may leave the vehicle exposed to low temperature at night. It refers to a pail for draining water from the radiator and motor. This pail should have a filter-funnel at the bottom for slowly refilling the organs in the morning while the motor is heating up, and, by means of this funnel, it should be able to stand alone on top of the radiator, so as to engage the driver's attention and time as little as possible.

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Cottoning to the supposed prejudices of car owners or the automobile industry is an art requiring skill and up-to-dateness. As the prejudices have practically vanished the sly art is most safely cultivated by saying nothing, and here the skill lies in using an extravagant number of words for saying it.

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Should the chauffeur be a servant? A momentous sociological problem, Madam, yet we solve it offhand. The answer is: Perhaps, but it is easier to make the servant a chauffeur; also cheaper.

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Optimism always wins in the long run, for the simple reason that pessimism can't win anything, aiming for nothing that is not already there. Hence, when we have downed a proposition, engineeringly speaking, we may well be prepared to find out later that it won't stay down.

Of all that has been said to explain why the great projected merger did not materialize only one remark is entirely fit for publication. According to this version all the parties concerned were too intelligent and wideawake. When 90 per cent brains is added to more 90 per cent brains, the sum still becomes nothing better than 90 per cent brains. The waste of human capacity for directing big affairs that was involved in the contemplated amalgamation was too appalling to contemplate.

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Car Control for Legless Persons

WITH the deplorable increase in the number of mutilated persons in France, new means are being devised for adapting the control mechanism of automobiles to physical deficiencies in the drivers. Among these arrangements one proposed by R. C. Baudry for the use of persons whose legs have been amputated or paralyzed has received an award from the *Société d'Encouragement pour l'Industrie Nationale* and is shown in the accompanying diagrams. For operating it, only the hands and the back of the driver are engaged. Braking is effected by backward movement of the body.

The clutch pedal is operated by means of a second handwheel which slides on the steering pillar and is connected with the clutch pedal as shown in Fig. 1. The steering wheel A carries the accelerator P. The clutch wheel B with tubular hub C terminates with an annular shoulder V which abuts against collar D fixed upon the steering pillar. The square-section rod X is mounted to slide in this collar D and the similar collar D1, lower down, and its upper end S hooks over shoulder V. The cable F with adjustment Y is attached to lug R on rod X and passes over the grooved pulley K, secured to the steering gear box M, to clutchpedal L.

To unclutch, wheel B is raised toward wheel A, while to engage the clutch it is allowed to be pulled down, and, as the wheel B can turn on the pillar, following any steering movements of wheel A and the hands guiding it, simultaneous steering action does not interfere with any desired gradation in the engagement of the clutch. The shoulder V may be provided with a ball bearing to reduce friction under the hook S, thereby further assuring the smoothness of operation, and the cable may be replaced by a mechanical articulation.

The brake control, Fig. 2, comprises the adjustable rod K attached to brake pedal H at one end and at the other to lever D which is pivoted to seat A at E and carries at the top the backrest C which is normally held forward by retractile spring L. To operate the brake, the driver thus simply leans back against C with more or less force.

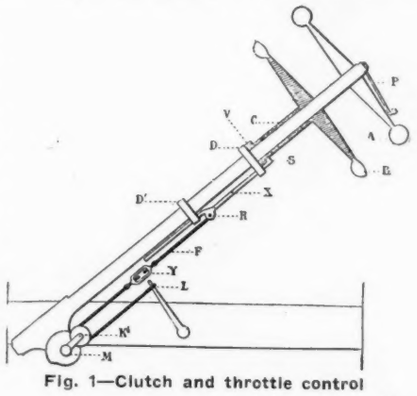


Fig. 1—Clutch and throttle control

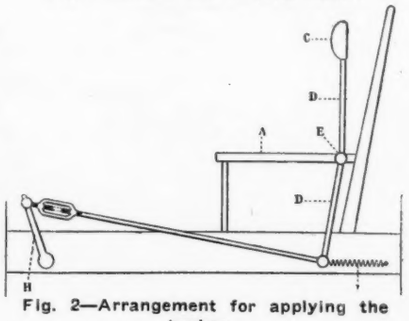
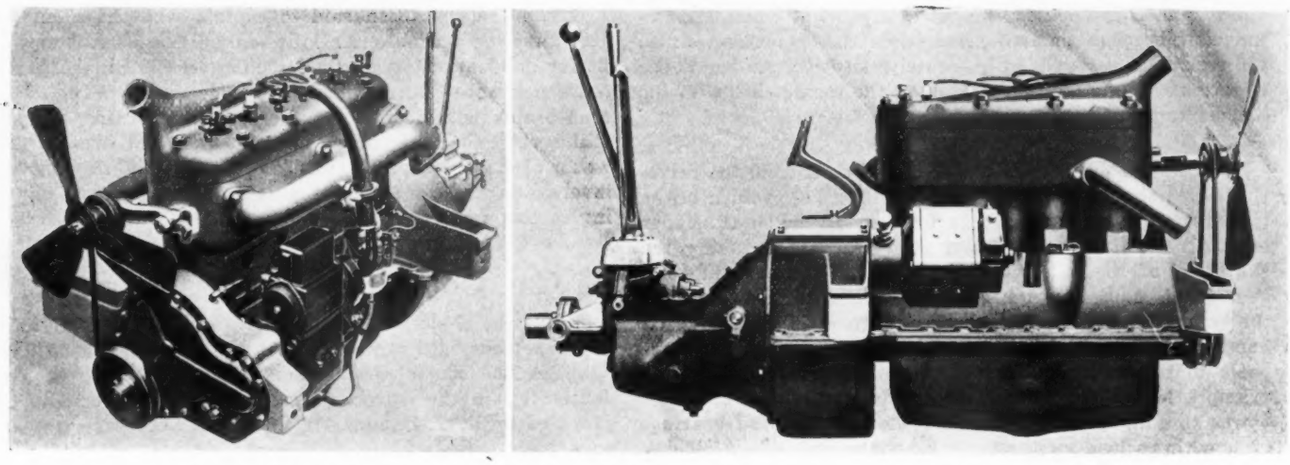


Fig. 2—Arrangement for applying the brakes

The designer, both of whose legs are paralyzed, has this equipment on a light car and experiences no difficulty in exercising complete control over the vehicle. — From *Le Génie Civil*, April 29.



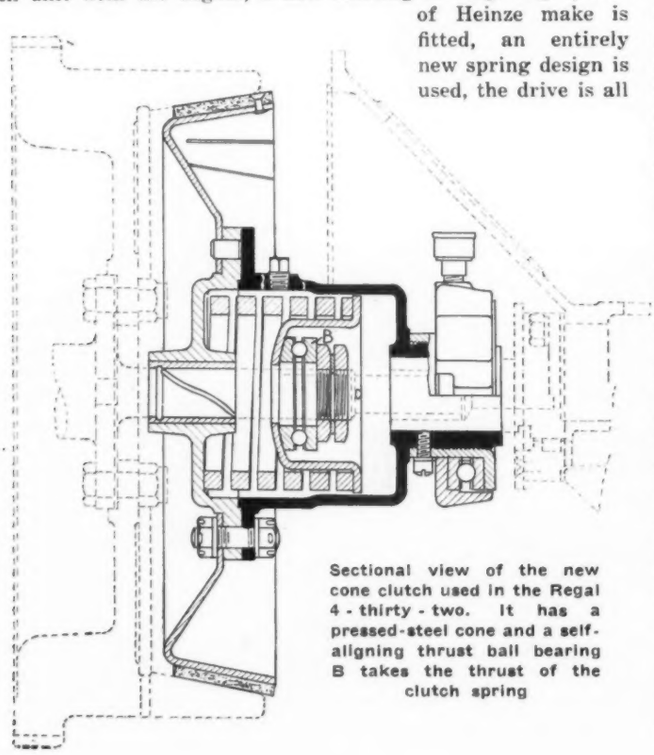
The new 3½ by 4¾-in. engine used in the Regal for 1917, showing the mounting of the electric units

Better Engineering in New Regal Four

3½ by 4¾-in. High Speed Engine Develops 32 H.P.

SELLING at $695, the new four-cylinder Regal is an entirely new design throughout and is undoubtedly one of the best in engineering detail on the market at this price. Certainly it is a better car than Regal has heretofore offered in this price field, and a great deal of thought has been paid to every detail, more of the parts being designed and built in the concern's own shops than ever before. For instance, the clutch and universal joints, parts that are very often bought from specialists in these units, are designed and manufactured wholly under the Regal roof for the new model, which is styled the 4-thirty-two.

Its engine is new throughout; the frame is of tapered form instead of being straight as in previous cars, the gearset is in unit with the engine, a new starting and lighting system of Heinze make is fitted, an entirely new spring design is used, the drive is all changed, a better rear axle has been adopted, the gasoline tank has been removed from the cowl and placed at the rear and a new body and hood of tapered form have been fitted. With all these differences over previous construction, the new Regal is therefore not a refined edition of any previous model, but may be regarded as a brand new car from stem to stern.



Sectional view of the new cone clutch used in the Regal 4-thirty-two. It has a pressed-steel cone and a self-aligning thrust ball bearing B takes the thrust of the clutch spring

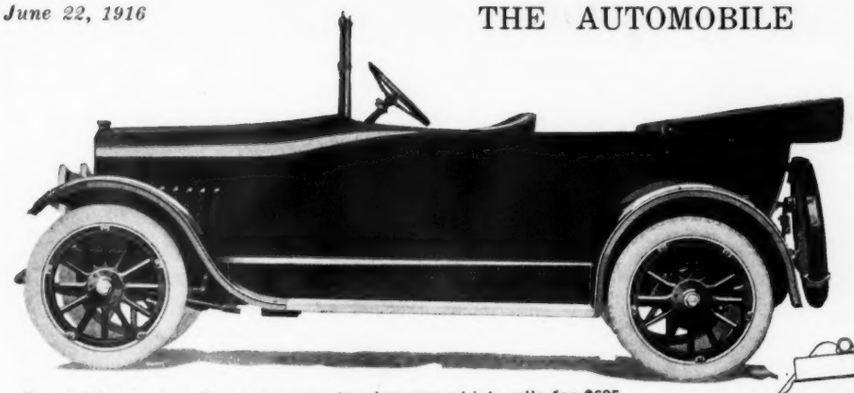
The new motor, which is designed to operate at higher average speed than previous power plants, in accordance with engineering dictates of the day, normally develops 32 hp. It has a bore of 3½ in. and a stroke of 4¾ in., giving a displacement of 183 cu. in., and a formula rating of 19.6 hp. A rigid engine is obtained by casting the upper half of the crankcase in unit with the cylinder block, this construction calling for a detachable head so as to make it easy to get at the interior for adjustment or repair. By making the cylinders and that part of the crankcase carrying the bearings of the crank and camshafts in one piece, it is possible to secure correct alignment of all the cylinders and the bearings, a feature which does its part in the securing of a smooth-running motor.

Valve Adjustments Accessible

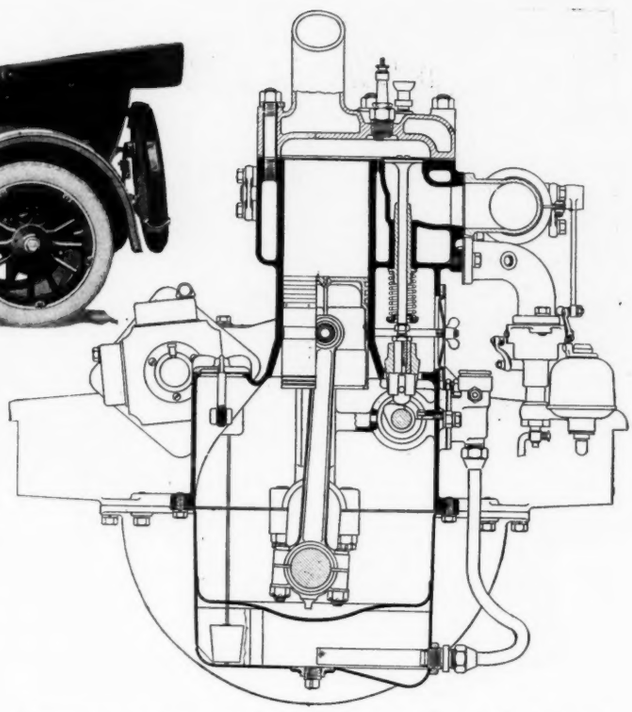
Valves are on the left and by a judicious placing of the exhaust manifold, carbureter and generator, which are the main units on this side, it is no trouble to get to the valve adjustments, after having removed the covers that inclose them. In connection with the valve adjustment, a refinement is noted that is bound to be appreciated by the man who has to take up the valves. The tappets are secured in their holders in such a way by means of a pin that they cannot revolve, but simply have up-and-down movement. Thus when a valve must be adjusted, it is not necessary to hold the tappet portion with one wrench while turning the adjusting nut with another wrench. Only the tool necessary to turn the one nut is needed, and after the right clearance has been secured, a lock nut sets it. The tappet assembly for two cylinders is removable from the top as a unit.

Very Long Pistons Used

Special mention should be made of the unusually long pistons that are used. These are made of cast-iron, but the section is very light and well proportioned so that there is



Regal 4-thirty-two five-passenger touring car which sells for $695



Transverse section through the new 3½ by 4¾-in. Regal engine

no excess weight. They measure 4½ in. from top to bottom, affording a long bearing surface that distributes and reduces wear and also practically eliminating any chance of slap. Three eccentric rings are fitted, and there are oil grooves at the bottom of the skirt to carry the oil down, besides a chamfered groove below the last ring slot, this being provided with a number of oil holes to return any excess lubricant to the crankcase. Thus, practically every possible precaution has been taken against oil getting into the combustion chambers to smoke and carbonize. The piston pins are also quite large —¾ in. diameter—and are secured to their pistons by tapered dowel screws.

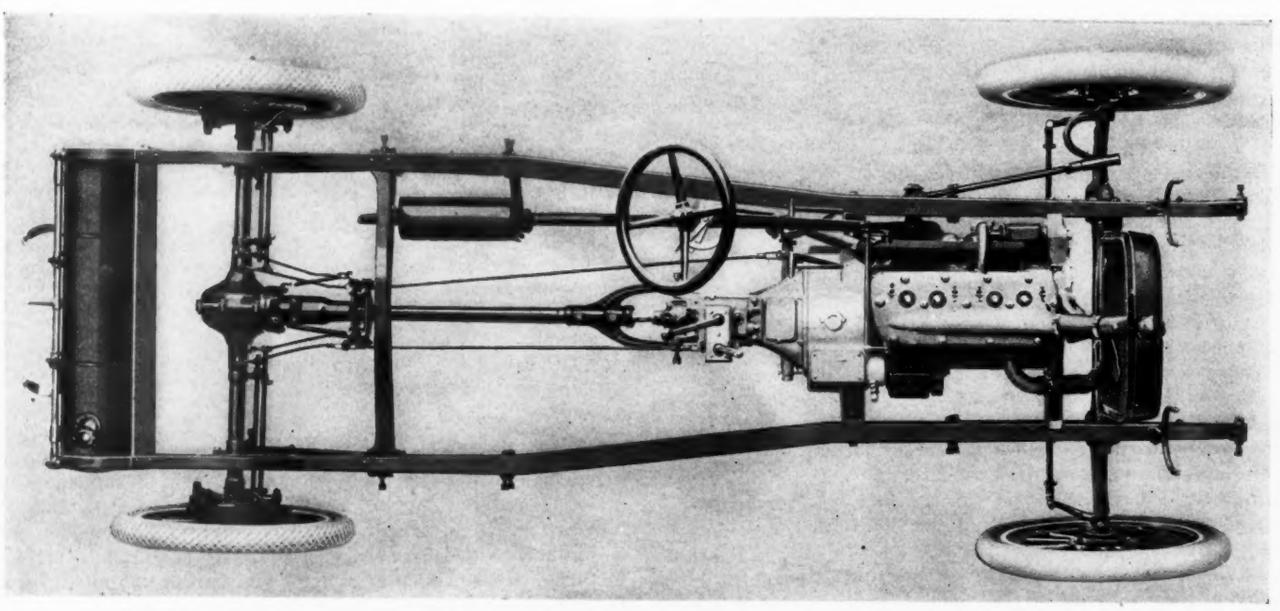
The rotating members are of ample proportions, the crankshaft being 1⅝ in. in diameter and having three die-cast babbitt bearings that are 2⅝, 2¼ and 3¼ in. long, front to rear, respectively. The flywheel bolts in place by a flange of large diameter, and the camshaft and generator shafts are driven from the mainshaft by helically-cut gears, the crankshaft gear being steel and the other two cast-iron for reasons of silence, since steel runs quieter against cast-iron. These are in a separate case from the crankcase and inclosed by a pressed steel cover.

Oiling System Well Worked Out

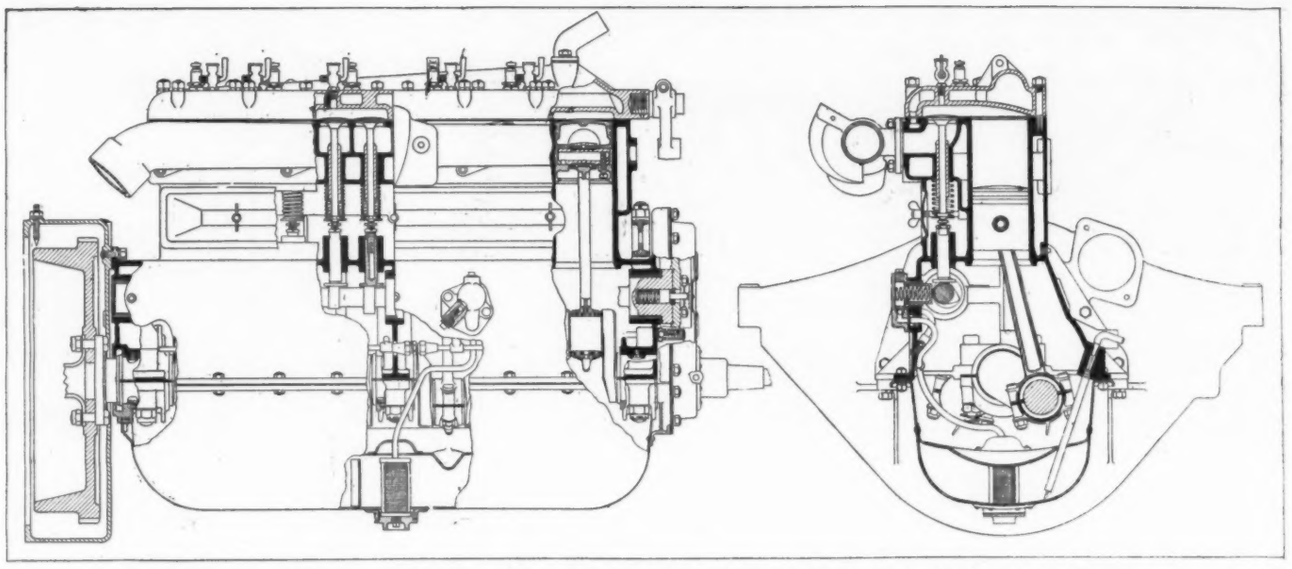
Special attention seems to have been given the oiling system in this new motor, for it possesses several commendable refinements in addition to the special provision in the pistons against leakage into the combustion chambers. A plunger oil pump, operated from the camshaft, draws the oil from the pressed-steel oil pan at the bottom of the engine, and after it has been strained it is led to the splash troughs in the usual way. A special lead runs to the point of mesh of the camshaft gear with the generator gear, but to insure its also getting to the mesh point of the camshaft and crankshaft gears without undue complication, a simple and effective scheme was hit upon. A little baffle plate was placed on the inner side of the inclosing case, and the oil, when thrown off by the camshaft gear, strikes this baffle and is directed straight onto the mesh point desired. Breathing is obtained through space provided around the tappet assemblies, and a large filler and oil gage are placed on the right side of the crankcase in convenient position.

One thing that has been especially looked to in the design of this motor is the clear valve passages. These have been

(*Continued on page* 1145)



Chassis of the new Regal model, showing the tapered frame, unit power plant, rear mounting of gasoline tank, etc.



Sectional views of the new light six motor used in the Kissel Hundred Point model, showing details of design

Kissel Brings Out Light Six

3¼ by 5-in. Motor, 117-in. Wheelbase, 32 by 4 Tires and Light Weight Render New Car Very Economical

THE Hundred Point six recently brought out by the Kissel Motor Car Co., Kenosha, Wis., as reported in THE AUTOMOBILE for June 8, is the smallest six-cylinder car which that company has produced and sells at the lowest price, both touring car and roadster listing at $1,095. The 6-42 model is continued.

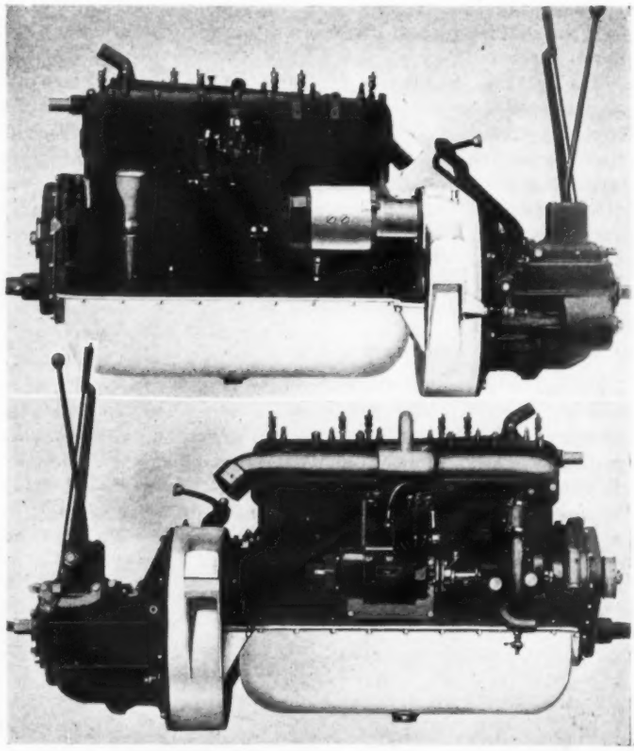
An Economical Car

The motor used in the new car has a bore of 3¼ and a stroke of 5 in. and develops 52 hp. The bore is ⅜ in. smaller than that of the model 42 and the stroke is ½ in. shorter. The wheelbase is 117 in., or 5 in. shorter than on the 6-42, rendering possible a considerable reduction of weight throughout the chassis so that 32 by 4-in. tires are of ample size for the load. This is one of the features of economy of the Hundred Point six which are made possible by the general weight reduction, smaller motor and other refinements of design.

Features of Motor

The motor is, in several ways a departure from former Kissel practice. The block cylinder casting forms the upper half of the crankcase and a pressed steel case completes the assembly. Bore is 3¼ in. and stroke 5 in. The valves are completely housed and have a 1⅝-in. clear opening. Special lightened annealed iron is used in the pistons and they are balanced to one-half an ounce before grinding. Leak-proof type rings of gray iron several degrees softer than the cylinders minimize wear on the cylinders.

The crankshaft is 34 5/16 in. long and operates in Fahrig metal bearings of the following sizes: Front, 2¼ by 2 1/16 in.; center 2¼ by 2½ in.; rear 2¼ by 3 in. Cams, bearings and all parts of the camshaft are machined from a one-piece drop forging. Camshaft bearing sizes are: Front, 2⅛ by 1 3/16 in.; center, 2 1/16 in. by 1 in.; rear, 1¾ in. by 1 in.



Exterior views of the new Kissel unit power plant, showing the neat and compact design. Note the high mounting of the carbureter. The starting motor is carried at the left rear to engage the flywheel, and the ignition and lighting unit on the right with the water pump

The timing gear construction makes use of one pressed Fabroil gear working between two steel helical gears. The Fabroil gear is instituted both to give the highest degree of wear and guard against noise. Lubrication is by combination force feed to the main crankshaft and splash to the connecting-rods and pistons. The number of grease cups on the motor is reduced to two as oil cups are substituted at all lubricating points except at the circulating pump. An entirely new Kissel-Stromberg carbureter has been designed for use on this particular motor. The carbureter is fed by a Stewart vacuum system.

The differential case is a malleable casting and all differ-

ential parts are interchangeable. High carbon strip steel is used in the side rails of the frame, which is designed to give absolute rigidity and freedom from weave. Rattling and sprung doors are eliminated by this construction. The side members are narrowed to permit a short turning radius.

Double External Brakes

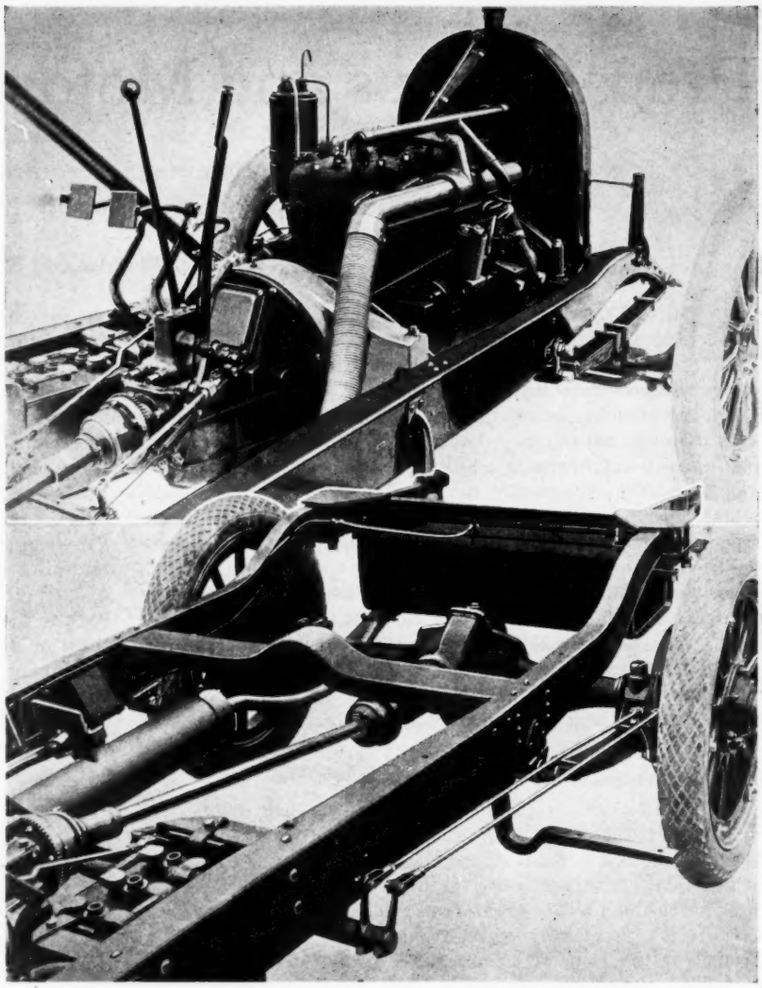
The distinctive floating rear axle with its design permitting easy adjustment of all bearings and of the pinion and ring gears is retained without change except for size reduction. The Kissel type of two sets of external contracting brakes, with 14-in. race and 2-in. diameter, is also evident. The elimination of internal brakes has as a purpose the riddance of rattling rods and levers.

A new feature for the 1917 six is the institution of oil bolts throughout the chassis in place of the conventional grease cups. These bolts are wicked from the bearing surface to a drilled hole through the center. The end is capped with a steel grease cap in the side of which is an oil hole. To lubricate the bearing, wherever it may be, it is only to twist the cap until the holes in the cap and the bolt match up, and squirt in lubricant from an oil can. There are only two grease cups to fill on the chassis.

An Easy-Riding Car

Due to its long, wide three-quarters elliptic springs the new car is as easy riding as the larger model 6-42. In the touring car the front seats are divided, a feature Kissel claims to have originated. Every feature of the body design savors of roominess. Black finish of all metal parts in the body interior gives a distinctive richness.

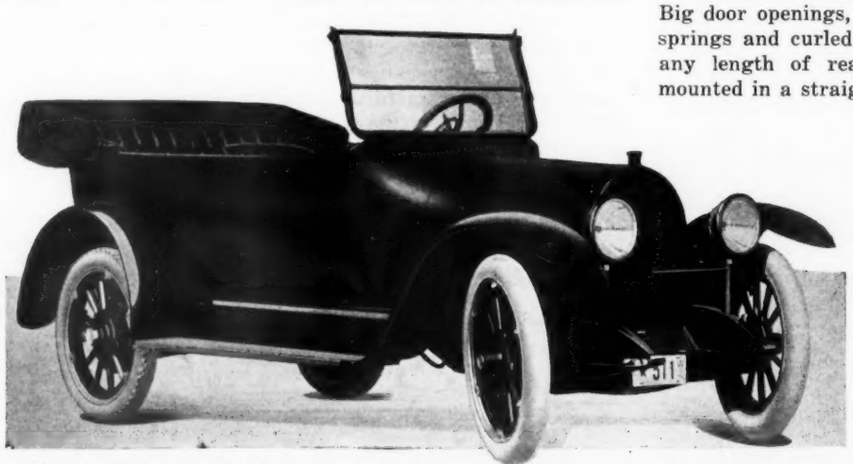
Remy ignition, Remy generator and starter with Bendix drive screw inclosed in a housing, in conjunction with a Willard battery, make up the electrical system. The clutch is integral with the transmission and is a leather cone with two adjustable fiber-faced spring plungers acting as brakes against the rim of the clutch when disengaged. The clutch spider is a steel stamping. The transmission is of the selective type with three speeds forward and reverse. The main shaft is mounted on larger annular ball bearings. Gears are drop forged of nickel steel. The driving mechanism between the gearset and the rear axle consists of a set of two universal joints with a connecting shaft. The floating rear axle has spiral bevel gears. Pinion and driving gears can be adjusted without disassembling the other parts. Timken bearings are used throughout. Drive and torque are taken through the rear springs with the Hotchkiss principle of drive.



Two chassis views. Note the mounting of the Stewart vacuum fuel feed system, the flexible exhaust line and the deep section frame. Also the battery mounting and the speedometer drive off the rear of the gearbox

Some of the other features of the new Kissel model are: Big door openings, extra deep upholstery of leather, cushion springs and curled hair. The driver's seat is adjustable to any length of reach and the indicating instruments are mounted in a straight line on the cowlboard. A pedal button is used to start the engine. The body is mounted over a felt packing on the frame which is very deep and constructed in such a way that it will not deflect and cause the doors to work loose and rattle. The body is given twenty-two finishing operations, being of 20-gage, silver finish sheet steel.

Sedan, coupé and town car tops are furnished for the new model, all being built in connection with an extra-strong lower body called the Gibraltar. The town car may be transformed into a victoria in fair weather, the sedan being quickly converted into a touring car and the coupé into a roadster.



Five-passenger Kissel touring car with individual front seats and selling at $1,095. The motor is 3¼ by 5 in. and tires are 32 by 4

Preparedness and Motor Trucks—Part III

Troubles, Weak Points and Requirements in Vehicles for Military Work as Revealed by the Great War

By Donald McLeod Lay

MAGNETOS cannot be relied on for more than 6 months average under war conditions. At the end of that time they have lost much of their magnetism and various screws have begun to work loose.

English trucks using force-feed lubrication had trouble with the external pumps breaking due to vibration and causing burned out bearings resulting from the loss of oil. It was found that frequently the ignition system was not adequately protected from water, this giving much trouble. Insufficient clearance caused the steering gear tie rod to strike the ground, throwing the gears out of line. Cooling and lubrication were found the greatest difficulties. Fan belts were too light and fans too heavy. Another trouble was in adjusting brakes, the adjustments being frequently inaccessible or requiring special tools which were invariably lost. Load platforms were of varying heights from the ground and tail boards were of many different designs, causing much trouble in loading and unloading.

Springs Frequently Broken

In the German campaign in Russia the bad roads frequently broke front springs either at the front end of the first leaf or just in front of the clips. Solid rubber tires gave out rapidly. Radiators were frequently pierced by bullets and shrapnel although protected from collision by fender rods. Carbureters frequently gave trouble and dual tanks suspended at the rear of trucks were always dented and frequently broken from striking stones, etc.

With the Allied armies there have been many cases of axle housings failing due to heavy loads shifted to the right side of the truck. Loads of shells are particularly liable to slip this way. Shackle bolts and springs gave considerable trouble under the stress of war conditions while the poor driving frequently made short work of clutches of all kinds.

Solid tires were found to wear well although there was a tendency to pulp up in certain parts, the wear seeming to be irregular, and large pieces breaking off. Owing to dense traffic behind the lines, convoys frequently had to get off the crown of the road to allow others to pass, this alternate contact with the dirt service and the edge of the granite blocks used in Northern France and Belgium causing a lateral frittering away of the solid rubber tires. Wheels with twin tires sometimes have the inner tire worn completely away while the outer one is in comparatively good condition. Trouble was also experienced with tires stretching and pulling off the rims due to the strains to which they were subjected when pulling out of a difficult position with wheels skidding violently.

An important feature of the automobile and motor truck branch of the service is the proficiency of the drivers. Inexperienced and poor drivers cost the French and British armies a tremendous amount of money and time, while the men who were really fitted for this work were digging trenches or in some other branch of the service where their special abilities were of no value.

Early in November, 1914, W. F. Bradley reported that the most suitable type of truck for war purposes is a vehicle carrying a useful load of 2½ to 3 tons and driven by a four-cylinder motor of 3¾ to 4-in. bore. This vehicle is illustrated in the accompanying diagram, which shows the necessity for certain features which was evident even during the first 3 months of the war. These are adequate clearance, stout sprags to prevent running backwards, towing hooks front and rear, four-speed gearboxes with a low emergency gear, interchangeable carbureters and magnetos, gasoline tanks of large cruising radius which are easily filled and emptied, drain cocks for cylinders and radiators and the ability of each truck to tow another of equal weight over ordinary roads. Provision should also be made for a reserve supply of fuel and oil. Towing ability is very important as trucks are frequently temporarily disabled and if they cannot be towed back to the repair shop at once it may be necessary to destroy them or allow them to fall into the hands of the enemy.

Touring cars on war duty should have space without littering the body for carrying 2 gal. of reserve fuel, 1 gal. reserve oil, two spare shoes, five or six tubes, a more complete set of tools than usual and a small selection of spare parts.

For military work controls should be simplified. The ideal is fixed ignition with magneto only and accelerator pedal. A lever on the dash should regulate minimum throttle opening and cut off the ignition when fully closed. The use of a motor governor is preferable, the war having converted the European manufacturers to this viewpoint.

Very useful if not indispensable accessories are differential locks and towing hooks, front and rear. Despite careful driving, a truck would sometimes get off the road into the mud; with hooks, a rope and differential lock, the other vehicles in the convoy could quickly extricate it, whereas without these accessories serious delays often ensued.

Detachable Wheels Valuable

Detachable wheels are valuable, as sometimes tire changes must be made under fire and time is precious under such conditions. For military work it is important that tires be the same size all around, the use of different sizes on front and rear wheels necessitating the carrying of spares for each while in the event of an excessive number of punctures or blowouts the available supply of spares for that particular size is insufficient.

Many trucks, especially the De Dion ammunition wagons, were fitted with powerful winding drums with steel cables, making it possible for the vehicles to haul themselves out of tight places. Electric starting systems have been found unnecessary, the batteries being generally removed from the vehicles and used for lighting trench quarters.

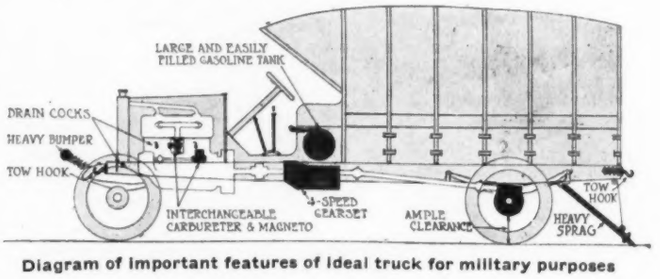


Diagram of Important features of ideal truck for military purposes

The FORVM

BLANK DIFFERENTIAL IS BEST APPLIED ON SOLID TIRES—ONLY OBJECTION TO IT IS POSSIBLE USE OF UNEQUAL DIAMETER REAR TIRES—STEERING MECHANISM PRACTICE IS UNSCIENTIFIC

Facts in Favor of the Blank Differential

By Arthur M. Laycock

Chief Engineer, Sheldon Axle & Spring Co.

I HAVE read with great interest the comments with regard to the abolition of the differential. There is evidently considerable misunderstanding in regard to my meaning and the summary was undoubtedly overlooked altogether, which reads as follows:

"After considering all the various points, it is well not to become too enthusiastic, as the introduction of a blank differential on the face of it is so drastic that one must of necessity move with extreme caution."

While I do not wish to retrench from what I have said in one iota, I think that it is out of the question for anyone to take this type of drive to meet all conditions. For short wheelbase, wide track, and trucks which have to maneuver a good percentage of their total running time it would be out of the question, but for bus work, army service work and for contractors' wagons it has decided advantages.

In going over the good points in my previous article, it might be well to mention the disadvantages which we have encountered in this drive through extended experimentation.

Best with Solid Tires

So far as we can see, the blank differential is best applied on solid tires.

Where pneumatics are used, proper inflation of the rear tires is absolutely essential—in other words, it is very necessary that not only should both tires be the same diameter, but the pressure in each should be about the same. This, of course, might be looked upon as a disadvantage, but it has its good points as well.

Even with the conventional differential it is very necessary that these conditions exist if the maximum efficiency be realized.

In high-speed pleasure car work, the car cannot be held as steady when running over rough roads. However, side skidding from braking is greatly minimized—in other words, it is infinitely safer to apply the brakes on a greasy pavement with the blank differential than with a conventional one. This, of course, applies to bus work and heavy trucking as well, and gives one confidence in city driving, which is readily appreciated.

Only One Real Objection

In all the correspondence the only real objection brought against the blank differential is the probability of using unequal diameter of rear tires. This, of course, would be very objectionable, but does not apply in ordinary service as much as one would think.

In a good many instances, where tires on one side of the truck are worn off first, the truck is kept in operation until both sides go before making the change. This is very general practice.

It is well to remember that the best design is only a compromise, and this is no exception to the rule, but with so many things in its favor, we are very certain of a large following in this direction.

General Steering Mechanism Practice Is Unscientific

By Theo. D. Stanley

General Service Engineers Co.

WITHOUT any purpose to extend further the argument on the methods of installing the steering mechanism in a car than to point out in the article of Leon A. Chaminade, in THE AUTOMOBILE for April 27, he seems to have overlooked the main point in my statement of the flexibility in the spring producing a degree of influence on the steering mechanism which applies to all forms, including his own, of fore and aft mounting.

The method submitted by Mr. Chaminade in shortening the link, also accentuates the influence of changes in the wheelbase as indicated by A. L. Clayden in the issue of Sept. 2, 1915. This changing of the wheelbase of a car is particularly noticeable in a truck, on which it may amount to as much as 3-in. difference in the wheelbase betwen a loaded and an unloaded truck, owing to the flattening of the curvature of the spring forms affecting both the brake and steering mechanism.

The theory and practice in steering and steering mechanism is receiving considerable attention and the general practice is found to be unscientific. The fore and afte method of installation is the least scientific or practical in several particulars. This method requires an extra knuckle steering arm or lever which has only one point of highest leverage, which is when the car is moving in the straight forward direction. It is the turning condition which requires an increase in leverage in steering a car, for the straight forward direction is more or less automatic.

The steering-link also is in an objectionable position and often has to be bent to clear the wheel movements. True, this curvature gives certain flexibility, but that should be provided for by other construction forms, and, theoretically, the more rigid the steering mechanism throughout, the greater the efficiency.

Deflection, especially under high speed, is responsible for the larger per cent of wear on all parts of the car, and to be provided against as far as possible.

If the roadway was of a fluid nature the feel of the helm might be interesting, but still far from ease of operation, and any sailor knows the feel of the helm is a hardship as the speed increases, and, with power-driven vessels useless for efficiency, Mr. Clayden to the contrary notwithstanding.

It is probable the latter part of the first paragraph of the contribution by Mr. Chaminade is accidentally misstated, since it appears rather contradictory, as "advantages" should not "cause bad wobbling" logically.

The History of the Pneumatic Tire—7

Invention of Pneumatic Tire by Dunlop in Ireland —Difficulty of Repairing Inner Tube—The Thomas, Bartlett, Overman, B. & C. and Other Cushion Types

The History of the American Automobile Industry—34

By David Beecroft

EARLY in 1890 the Sweeting Cycle Co. of Philadelphia received a shipment from England of bicycles with pneumatic tires. At first received with derision, the success of the bologna tire on the track as well as its comfort on the road quickly made it popular. The first ones were about 2¼ to 2½ in. in diameter, which made them look almost balloon-like as compared with the ⅞, ¾ and even ⅝-in. solid tires then in use, and as a result they advertised themselves very rapidly.

Dunlop Invents Pneumatic Tires

These first pneumatic tires were the invention of John B. Dunlop of Dublin, Ireland, and while following the general idea of Thompson, as laid down in 1845, seem to have been an independent development, and in some respects, not so well worked out. Dunlop's tubes were inclosed in a jacket of Irish linen which was held to a rim almost flat by linen flaps pasted with rubber solution to the inner surface of the rim. The linen jacket was then protected by a tread of vulcanized rubber pasted on its circumference and lapping down almost to the rim or even up on it as did the linen flaps. This material was found unsuited for tire manufacture by reason of inability to stand flexion and the working of warp and filler threads in use, resulting in mutual destruction.

Inner Tube Inaccessible

When in place, this tire was rather wider than deep, and being of large size did not need high inflation, so that it rode very easily over any rough road. When permitted to stand for some time after being made up, the rubber solution held quite well, but if used quickly, it softened under heat and some parts were likely to come loose. Its particular defect, however, was the difficulty of getting at the inner tube for repair purposes. The casing or cover had to be loosened by soaking the solution with gasoline, followed by opening the linen jacket which afterward had to be repaired by sewing and solutioning a patch over the opening. Naturally, such difficulty displeased users and hindered buyers, but so busy were the makers supplying orders that they did not stop to concern themselves with improvements.

The Thomas patents controlled by Bidwell seemed to offer a more satisfactory arrangement, while other inventors began to get into the field with other devices. The Dunlop patent of March, 1890, was followed almost immediately by the Wilson patent, in August, which showed an arch of rubber with its ends abutting between the sides of the rim and which could contain an air tube or some yielding material, like sponge or hair. In the same month, the Bartlett tire appeared in England. This was very similar to the Wilson, in that it was arched in shape, the base of the arch being its widest portion and the tire being rather V-shaped instead of cylindrical, as modern tires are made. Bartlett's tires attained some prominence on the market in England, probably because they were properly pushed.

The Overman Cushion Tire

The A. H. Overman patent on a cushion tire was brought out in the early fall of 1890 and the Banker & Campbell tire quickly followed. The former was arched in shape but contained no fabric, and was introduced as a substitute for the pneumatic, instead of falling in with the public's fancy and attempting to supply it. It was marketed on Victor bicycles for several years until the insistent demand for pneumatics suppressed it. The Banker & Campbell tire was circular in section but instead of the single hole in the center such as the earlier carriage types used, it had seven holes with fairly strong walls between them. This was offered as a substitute for the pneumatic but did not prove to be such. The resiliency of an all-rubber tire is less than that of an air tire; the weight is more for a given size, and in most tires, having the holes running lengthwise, the constant bending along a certain line eventually cracks the rubber on the inside. Just why rubber will stretch on the outside of a bend without damage but breaks on the inside where it is compressed seems difficult to understand but such is the fact, and many tire makers were obliged to learn this simple thing by costly experience.

Another Cushion Type

Early in 1891, the A. Strauss cushion tire, held in place by bolts, having their heads in the central hollow and their stems passing outward through the open base, was brought out by the New York Belting & Packing Co.

The Rostrum

No Lag in True High-Tension Magneto

EDITOR THE AUTOMOBILE:—We have noted in THE AUTOMOBILE for April 27, your reply in the Rostrum to L. L. S. of Columbus, Ohio, stating that the spark is advanced on an automobile, when cranking on the magneto, to take care of mechanical and electrical lag, and to make the explosion occur as nearly as possible to upper dead center. You also advise your correspondent that "set ignition is used simply in order that the explosion resulting from the spark will occur as near upper dead center as possible."

Please be advised that in the true high-tension magneto no lag whatever exists, either mechanically or electrically speaking. When starting on the magneto, where manual advance and the independent type of magneto are resorted to, it is customary to advance the spark about half way, this giving about 17 deg. advance before upper dead center, for the reason that the spark in that position is stronger than in full retard and cannot cause a back kick on account of the fact that if the engine is turned over at a speed sufficient to cause the magneto to overcome the resistance of the spark plug gap the flywheel will also be turning at sufficient speed to carry the engine over center.

Set spark magnetos giving from 17 to 20 deg. advance ahead of upper dead center are used to a considerable extent on motor trucks in order to eliminate the possibility of low efficiency or damage to the engine resulting from irresponsible drivers leaving the spark control levers in either full advance or full retard positions, paying no attention to spark position at any speed or load.

Set spark ignition in such work insures about as good average results as does the manually advanced magneto on the average pleasure car when handled by the owner.

New York City. ALBERT H. ZIEGLER,
Technical Dept., Bosch Magneto Co.

Likes Horn on Cadillac 8

Editor THE AUTOMOBILE:—What make is the horn used used on the Cadillac eight?

2—Is it vibrator or motor-driven?

3—Its price?

Battle Creek, Mich. W. H. G.

—The type 53 horn is known as the Auto horn and is manufactured by the Dayton Engineering Laboratories Co., Dayton, Ohio.

2—It is of the vibrator type.

3—The price of this horn is $12, purchased at the factory of the Cadillac Motor Car Co., Detroit, Mich.

Information on Charging Batteries

Editor THE AUTOMOBILE:—Kindly inform me of the cheapest and most efficient way of charging six 6-volt storage batteries or a total of eighteen cells where the only available current is 110 volts A. C. and 235 volts D. C. I am figuring on an average of six batteries per day.

Also kindly give me the comparative costs of charging with rectifiers, motor generators, resistances and lamp banks.

Newark, N. J. R. C. R.

—The 110-volt A. C. is absolutely of no consequence, unless it is converted by means of a rectifier or motor generator set, and in view of the tremendous loss in efficiency, we would not recommend the use of 235 volts D. C. to charge an average of six batteries per day. The average voltage of six 6-volt batteries arranged in series would be 48.

The following table will give you a very good conception of the efficiency of charging through mercury arc rectifiers and motor generator set as compared to resistance in the form of a rheostat, or bank of lamps:

	Battery Voltage	Charging Voltage	Efficiency of Charge	Efficiency of Gen.	Total Efficiency
Arc Rectifier	48	48	100	85	85
Motor Gen. Set ...	48	48	100	88	88
Resistance	48	110	42.5	100	42.5
Lamp Bank	48	110	42.5	100	42.5

A Special Paint from Japan

Editor THE AUTOMOBILE:—In THE AUTOMOBILE for Jan. 20, 1916, page 118, I saw that the Fleetwood Metal Body Co. exhibited a car painted green in which brush marks are plainly left using a special paint that does not need either dryers or varnish applied with the brush and not rubbed smooth and in use it wears smooth and gives a dull finish that has the most durable wearing qualities. What kind of paint is used?

2—Where can it be bought?

3—How is this paint mixed?

4—How many coats are applied and how long does it take to dry?

Kansas City, Mo. J. W. A.

—This car was painted with a green color called E. R. H. Special No. 2000 and No. 1051.

2—Manufactured by Egan-Ronan-Hausman Co., Brooklyn, N. Y.

3—This color is ground in Japan, thinned to a paste with turpentine and then linseed oil added to obtain the proper working quality.

4—Two coats are applied with an ox-hair brush, then lightly rubbed with pumice and the last is applied in the same way, very lightly rubbed again. It is then brightened up with linseed oil rubbed on with cheesecloth and thoroughly rubbed dry. Each coat will air dry in about 24 to 30 hr.

Pressure Required to Close Brakes

Editor THE AUTOMOBILE:—Relative to the answer to my inquiry entitled Pressure Required to Close Brakes, I am afraid I did not make my request quite plain enough. About the direct pressure necessary to throw the emergency brake on so as to stop a car within twice its length going at approximately 25 to 30 m.p.h., I was told that it would take 1000 lb. The 20 lb. you speak of refers to throwing on the service brake gradually through the medium of levers.

Springfield, Mass. C. M. E.

—The exact amount of pressure applied on the drum will, of course, vary with the co-efficient of friction of the brake material and the weight of the car as well as with the other factors you mention. Your question can be answered most

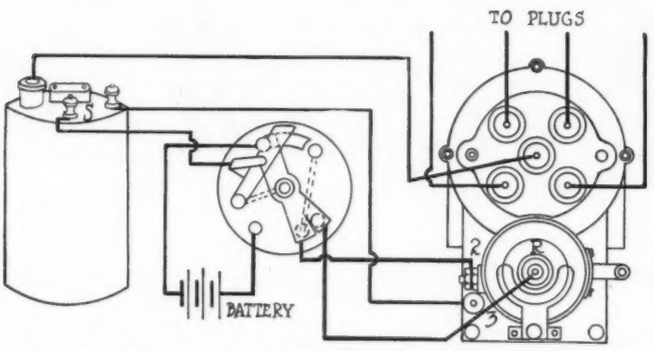


Fig. 1—Wiring diagram of the Splitdorf ignition system used on the 1910 model Cadillac, showing the various connections from magneto to coil and switch and also battery connections

clearly by giving an explanation of the work done by brakes. Where W is equal to the total energy absorbed in accelerating the mass M from zero to V ft. per sec; w = energy per second absorbed under the above conditions $= \frac{W}{f}$ where f = time required for acceleration in seconds. θ = tangent of the grade angle, or the per cent of grade; F = accelerative force applied by the propelling system; g = gravity = 32.2. Also

$$W = MV\left(\frac{Q}{F} \quad \frac{V}{2}\right)$$

where $\theta = o$ and

$$f = \frac{MV}{F}$$

Energy required to be absorbed by the brakes when stopping a motor vehicle, on the level, from full speed is equal to

$$E = \frac{MV^2 + Mg\theta fV}{2}$$

$$f = \frac{MV}{F - Mg\theta}$$

using the same symbols as for the clutch formula but applied to retardation instead of acceleration.

The brake size and pressure is figured out in this way mathematically for the size and weight of car and then a reasonable factor of safety is allowed.

Regulating the Timing on a Magneto

Editor THE AUTOMOBILE:—In regulating the timing of a magneto on what point past dead center on the power stroke of the piston should the explosion take place when the magneto is fully retarded. In other words, when the magneto is retarded should the explosion take place before piston reaches dead center or passes on the power stroke, and if so, what distance before or after dead center?

Newark, N. J. C. N.

—In regulating the timing of a magneto the spark should occur on upper dead center in the full retard position.

Gear Ratios of Several Cars

Editor THE AUTOMOBILE:—What is the gear ratio of the 1916 Oakland six, 1916 Saxon six and 1916 Hudson 40?

Kellogg, Minn. J. D. C.

—The gear ratio of the 1916 Oakland six is 4.25 to 1. Of the 1916 Saxon six it is 4.75 to 1 and on the Hudson the gear ratio is optional although there is a standard which is generally furnished of 4.45 to 1.

Plug Points Too Far Apart

Editor THE AUTOMOBILE:—Please tell me the cause of an Eisemann dual magneto spark jumping across the safety gap when idling. The wiring is in good condition and it does not cause the motor to miss.

2—Please publish wiring diagram of a Splitdorf ignition system such as used on 1910 Cadillac.

Wilmington, Ill. M. L.

—The cause of an Eisemann dual magneto spark jumping across the safety gap when idling is that the spark plug points are too far apart. For general guidance we suggest that the gap be made 1/64 to 1/32 in., but never more for a high-tension magneto. Then the cable connections from the distributer plate to the spark plugs may be burned at either end or somewhere along their length, which would inhibit the spark from jumping in the spark plugs and it would be referred back to the safety gap. Then too, unless the carbon brushes in the distributer arm should make good contact either the spark may jump at the brush or be referred back to the safety gap depending upon where the greatest resistance is. Likewise the mixture, its consistency or density at times plays a part in causing the spark to jump the gap.

2—Wiring diagram of Splitdorf ignition system used on 1910 Cadillac is shown in Fig. 1.

To Prevent Overcharging Battery

Editor THE AUTOMOBILE:—How can a switch be put on different makes of starting and lighting systems to keep from charging the battery when fully charged, or is it only necessary to place a switch so as to open one side of your generator line? Does it harm the generator?

2—I would like to know how to tell platinum points from tungsten points and what difference it makes with the running of the car when you use tungsten magneto points or genuine platinum points.

3—Is there a good substitute for platinum?

4—What amount of voltage does a Ford magneto have when engine is speeded up? In using two 9-volt bulbs in series it must produce 18 volts to light them brightly.

Parker's Prairie, Minn. H. S.

—With the majority of equipment a switch put on the open side of the generator line is all that is necessary. It cannot harm the generator in any way.

2—The only way to make certain of a composition of sparking points is chemical analysis. Tungsten magneto points are claimed to give at least as good service as platinum points.

3—There are many substitutes for platinum, but absolute proof regarding their quality is at present lacking.

4—Approximately 21 volts.

Wiring Diagram of Deaco System

Editor THE AUTOMOBILE:—Kindly publish wiring diagram of Deaco lighting and starting system on a 1914 Maxwell special Model A-35.

Scranton, Pa. L. J. S.

—Diagram of Deaco lighting and starting system on 1914 Maxwell model A-35 is shown in Fig. 2.

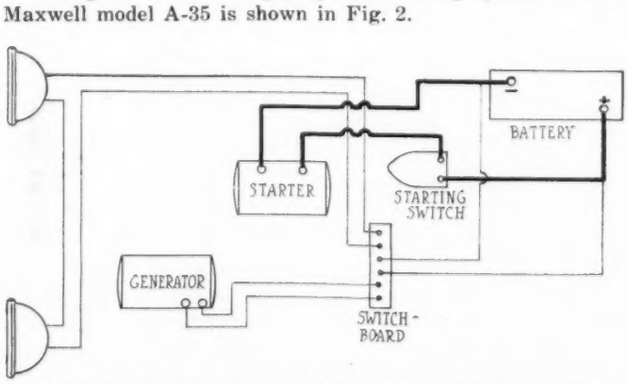


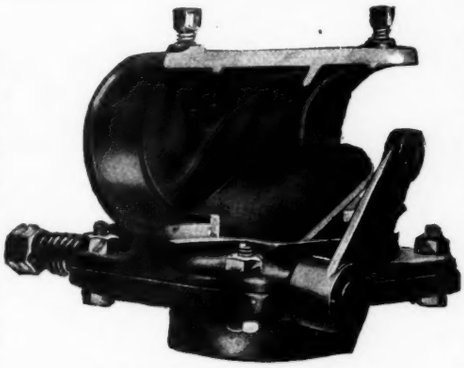
Fig. 2—Diagram of the wiring of the Deaco starting and lighting system used on the 1914 Maxwell model A-35, including connections to generator, starting motor, battery and switches

ACCESSORIES

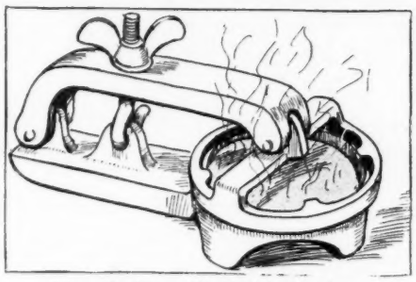
G-P Muffler Cut-Out

THE quiet running which characterizes modern automobile engines and especially those of the multi-cylinder type renders a muffler cut-out particularly useful in detecting missing cylinders or other irregularities in operation. The G-P muffler cut-out, illustrated herewith, has been brought out to meet the requirements for such work as well as for use where it is desired to relieve the engine from any back pressure which the muffler might cause. The construction of the valve tongue and its seat is such that when the cut-out is opened the line to the muffler is completely shut off and a correct angle is obtained to deflect the exhaust gases freely without back pressure. The cut-out is made in two parts, allowing ready access to its interior. When it is closed the pressure of the exhaust gases cannot open it and the course the escaped gases must take tends to prevent carbon accumulation on the valve or its seat. The area of any section of the cut-out is at least 25 per cent greater than that of any section of a corresponding size exhaust pipe. The cut-out is not attached by means of flanges, the ends being bored to the exact size of the exhaust pipe with shoulders at each end while set screws, as illustrated, prevent shifting and insure rigidity.

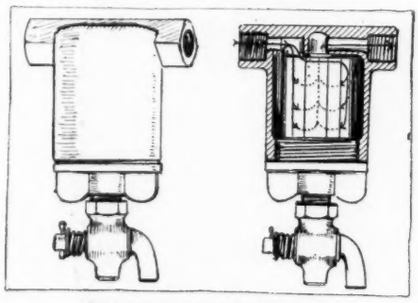
A table of exhaust pipe sizes of various makes and models of cars has been compiled and embodied in a convenient wall hanger which can be had for the asking.—Cut-out is manufactured by the G. Piel Co., Long Island City, N. Y. Cut-out and hanger are distributed by the Edward A. Cassidy Co., 30 East Forty-second Street, New York City.



G. P. muffler cut-out in section



Marvel, Jr., solid fuel vulcanizer



10 in 1 gasoline line strainer

Brugan Economy Valve

Auxiliary air is automatically supplied to the manifold by this valve. The valve casing is screwed into the intake pipe and houses a valve which is closed by a spring. At low speeds, the valve remains closed, but as suction increases the valve opens and air enters through the small ports in the end of the valve housing. Price $4.—Brugan Co., Bangor, Me.

Marvel, Jr., Vulcanizer

Simplicity is a leading feature of this little vulcanizer. It consists of a pair of arms terminating in a stationary disk and a swiveled disk with a cupped upper surface; the cupped piece is on the upper arm and the two disks are pressed together with the tube to be repaired between them by means of a thumb-nut. The heating medium is a disk of prepared fuel which is placed in the cup of the upper disk and ignited with a match. It burns, or rather glows, without flame and produces exactly the heat required. Patches are applied without cement. The process is to clean the tube, apply the patch, clamp it in the vulcanizer, light the disk and let it stand for eight minutes after lighting. A patch so vulcanized cannot be removed without tearing up the tube. Fuel disks and patches are supplied with the vulcanizer. Price, $1.50.—Marvel Accessories Mfg. Co., Cleveland, Ohio.

Left — Brugan economy valve. It gives additional air
Below — Red-I-Cut body for Fords. Car weighs 1150 lb.

10 in 1 Gasoline Strainer

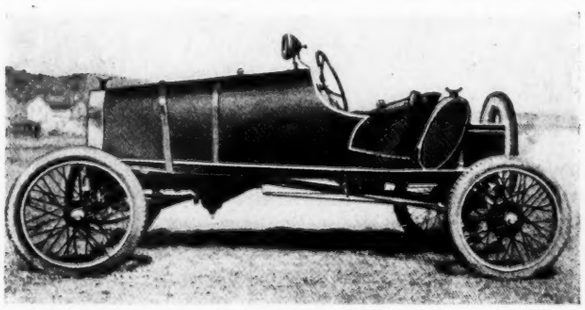
In this device a series of cylinders of straining gauze offers such a large surface that clogging is practically eliminated. The cylinders are set up on the sediment cup, which screws out for cleaning. A drain cock at the bottom is provided for draining off water or getting gasoline. An arrow on the pipe connection shows which way the device should be attached. The strainer sells for $2.—10 in 1 Strainer Co., Inc., Brooklyn, N. Y.

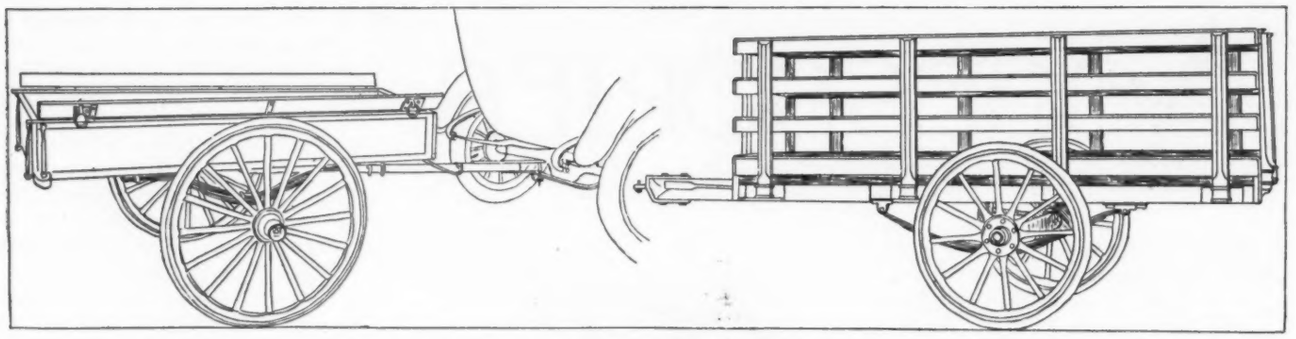
Red-I-Kut Ford Body

Complete directions and drawings are furnished for equipping a Ford with a racing body, all the material required may be obtained at any hardware store and no tools are required other than a hammer, saw, tinner's shears and ordinary wrenches. The weight is 300 lb., bringing the total weight of the car to 1150 lb. Improved appearance, increased speed and hill climbing ability are the particular features claimed for this body construction. Speedster body patterns for all makes of cars together with complete instructions are furnished for $10. Price of patterns, $5; complete body, price on application.—Kuempel Co., Dubuque, Ia.

Stinson Tire

The product of 10 years' work, study and experiment, the Stinson tire has been developed and tested under all sorts of road and season conditions. It consists of a broad, flat outer rim and a narrower flat inner rim connected by coil springs under slight tension, the springs being set in sufficiently from the edges of the outer rim so that, while they are



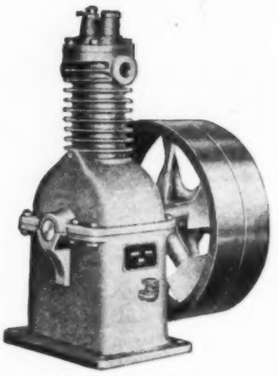


Bettendorf trailer which is made in 800 and 1200-lb. capacities, method of attachment being shown at the left

easily accessible for replacement, no amount of lateral displacement of the outer rim will expose them to thrusts from the road. The springs are set sufficiently close together to form circumferential screens at each side of the tire to exclude the larger pebbles. To prevent over-stretching the springs, a continuous rail or buffer is fastened to the inner periphery of the outer rim and extends toward the inner rim, restricting the motion of the wheel toward the outer rim to ⅛ in. As this tire is a suspension type and all values are figured from the top instead of from the bottom, this limited motion does not destroy its resiliency. In striking an obstruction the tire does not take a thrust direct to the spokes but a torsional movement is set up between the inner and outer rim, this torsional resiliency being of great value in starting and braking. The driving power is transmitted to the top of the tire, the weight of the car tending to increase the tension at the top and to decrease it slightly at the bottom. The tire can be painted as easily as the car and is very durable.—Stinson Tire Associates, Gardner, Mass.

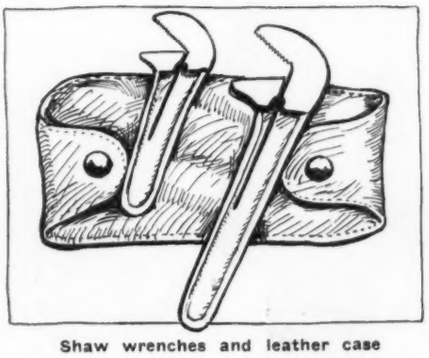
Curtis Air Compressor

This single-cylinder, air-cooled compressor is offered with a variety of mountings to suit various garage needs. The intake valve is a poppet and the exhaust a cone valve, spring-seated. Lubrication is by splash, and is so controlled that no oil will be carried out through the air-discharge valve. One pint of oil is ample for 100 hr. There is a high and low level gage, the flywheel has fan blades to assist in cooling, and the head is removable without breaking pipe connection or bending any pipes. There is only one gasket. The crankshaft is drop-forged and the bearings are die-cast. A hand unloader permits starting against pressure. The pump is made in five sizes, from 1⅝ by 2 to 4½ in. square, corresponding capacities being 1.2, 1.8, 2.99, 4.32 and 10.4 cu. ft. per min. Prices, less 10 per cent, are respectively $19, $21, $26.50 and $60, with tight pulley only. The style W comprises a compressor driven by belt by an electric motor, the whole being mounted on a cast-iron base. The price, complete, varies from $72 to $253, depending on the size of the unit and whether A.C. or D.C. current is required.—Curtis Pneumatic Machinery Co., St. Louis.



Curtis air compressor for garages

Stinson spring-cushion tire



Shaw wrenches and leather case

Bettendorf Trailer

Bettendorf trailers are two-wheelers, with wood wheels and solid rubber tires. The specifications of the smaller model, which has a capacity of 800 lb., are as follows: Body, solid panel, 72 by 51 in., 10 in. high with 6-in. flareboard; springs, semi-elliptic, underslung; axle, ¼-in. square; bearings, ball; wheels, hickory with 30 by 1¾ solid clincher tires; painting body red and wheels yellow with black striping; weight crated, 375 lb. The 1200-lb. model specifications: Stake body 8 by 4 ft.; side and end gates 18 in. high, all removable; springs semi-elliptic, underslung; axle truck type, I-beam section, 2 by 1½ in.; bearings, Bower or Timken roller; wheels hickory with 32 by 2 solid clincher tires; painting black; weight crated, 445 lb. Automatic couplers are fitted, and these can be attached and detached in a few seconds. The 800-lb. trailer sells for $75 and the 1200-lb. for $100.—Bettendorf Trailer Co., Bettendorf, Iowa.

Shaw Automatic Wrench

This wrench has a V jaw with one part toothed and the other flat. The two jaw members are split so that when a pull is applied to the handle the jaws take firm hold of the work, whether it is square, round or hexagonal. It is thin, enabling it to go into tight places, requires no adjusting, is in one piece, lets go instantly, light and strong. The 4 and 6-in. wrenches are supplied in an imitation seal case at $1, and $1.25 in pigskin and morocco. These sets are especially for the use of motorists. Price, 4-in., 35 cents; 6-in., 60 cents; 8-in., 75 cents; 10-in., $1; 15-in., $1.25.—Shaw Propeller Co., Boston, Mass.

Zit Dry Wash

Zit is a body polish which is designed to take off the dust and restore the original luster. The body is sprayed with the liquid and then polished with cheesecloth. The sprayer is also furnished.—Westfield Chemical Co., Westfield, Mass.

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More Discussion

BRILLIANTLY successful as the recent convention of the Society of Automobile Engineers was, there are always some thoughts of constructive criticism which arise after a meeting of this kind. This time the thought which stands out above all others is that there should be longer and better discussions on the papers that are presented.

It would be hard to improve on either the program or the papers that were given at this last session of the society. It would be a mistake to curtail the number of the papers and it would also be wrong to shorten the papers themselves, yet the discussions, in order to bring out the full value of the session, must be longer.

With the general public and the industry at large, the question which naturally springs to the mind is, "What is the use of having all these engineers together in convention unless they comment freely on the subjects under consideration?" and truly, this thought is but natural and right, for if the discussions are not full and thorough, the great potential value of a gathering of this kind is lost and the natural tendency is toward a drop from the level of an engineering session to a non-commentative lecture audience.

It may seem that the remedy would be difficult if the program were not to be curtailed and the time of the convention lengthened, but this is not necessarily so. The activities of the S. A. E. can be readily classified into different fields and there would be no difficulty, even on a vessel such as the *Noronic*, to have two sessions under way at once. Perhaps while tractors are being discussed on the upper deck, aeroplanes may be under consideration in the hold, and men who were roaming the deck because the particular paper under consideration did not interest them, would be in active attendance and, perhaps, stirred by the impulse of animated discussion to shed illumination on a topic that would otherwise remain obscure because of the lack of opportunity or time to properly warm up the arguments.

Mobilization

DEVELOPMENTS in the controversy with the de facto government of Mexico will be watched very closely by the automobile and motor truck industry which would be one of those most affected if actual hostilities should begin. Already the United States Government has placed several orders for motor vehicle equipment which is needed on the border for the use of the troops already there and if the militia forces now mobilizing all over the country are sent to these points further orders will doubtless be placed.

Aside from the necessity of co-operating with the Government authorities in making quick delivery on orders received, which the factories have already demonstrated their ability to do, the automobile and motor truck industry can be of assistance in many other ways in the present crisis. Some of these are: Co-operating with the industrial preparedness committee of the naval consulting board; facilitating mobilization by protecting employees on military duty from financial worries; supplying trained men and comprehensive information for transport work of all kinds; preparing for future requirements of the government, etc.

S. A. E. Expansion

THE proposal to widen the scope of the S. A9. E. and to make it include all sorts of automotive activity comes as a natural step in the progress of internal combustion engineering as applied to motive power. Gradually the aeronautical, marine and tractor fields have acquired the same tendency toward standardization and economic production that has made the automobile what it is to-day.

With this state of affairs existing it would be uneconomical and against that very spirit of standardization which is so desirable in these arts, to have more than one parent organization which fosters the development of design and manufacture. There are certain basic principles in all these kindred industries which are so closely alike that it would be wrong to set up a different set of standards for each when it is so readily possible to unify these departments of the same development and to allow them to march side by side down the same avenue of progress.

Civilian Trucks for U. S. Army

Truck Club Has Plan of Pledging Vehicles for Purchase by Gov't.

NEW YORK CITY, June 21—*Special to* THE AUTOMOBILE—A plan for obtaining civilian motor trucks for the United States army along the Mexican border, should war eventually result from the present strained relations between the two countries, will be discussed at the meeting of the Motor Truck Club of America to be held in this city to-night. The calling out of the militia of all States is expected to result in an additional need for several thousand trucks and the plan of the Motor Truck Club seeks to enroll civilian machines for this work, should the American commercial vehicle manufacturers be unable to supply the demand within the required length of time.

If the procedure followed by the foreign governments of commandeering all civilian vehicles at the outbreak of war is adhered to in this country, it will cause great hardship to the owners of the vehicles and perhaps failure, due to the fact that the motor trucks now in use in this country are now carrying on a large percentage of the nation's transportation. The plan to be discussed by the club would seek to eliminate any such possibility by having a large number of owners pledge a certain proportion of their trucks to the government in case of war. The plan at present outlined contemplates the placing of a certain price on each vehicle by its owner, this price to be the original cost of the vehicle, its body and equipment less a certain sum due to depreciation of the vehicle over the number of years it has been in use. After this has been done and the vehicle pledged to the government in case of war by means of a special form filled out by the truck owner and a representative of the club these forms will be grouped according to the make of vehicle and sent to Washington to the Secretary of War. If after this has been done, war should be declared and it is found impossible to obtain the requisite number of trucks, the War Department will then take over the trucks, issuing bills of purchase.

—

Another Gasoline Hearing

WASHINGTON, D. C., June 17—A special hearing has been set by the Federal Trade Commission for next Wednesday to enable the Standard Oil Co. of Ohio to explain why it is able to charge several cents more a gallon for gasoline than is charged by its competitors.

At a hearing a week ago the commission reached the conclusion that the failure of the Standard Oil Co. of Indiana to compete in the Ohio territory permitted the higher prices there, and was one of the underlying causes of the demoralization of the oil industry.

Investigations have shown that there is a decrease in the production and an increased demand that justifies part of the increase in price, but the commission is convinced that there is no economic justification for the enormous raises that have been put into effect.

—

Chrysler Buick General Mgr.

DETROIT, MICH., June 21—Walter P. Chrysler is not to leave the General Motors organization. He has been advanced from the position of factory manager of the Buick Motor Co. to general manager, filling the vacancy occasioned by the resignation of President C. W. Nash of the General Motors Co., who was also president and general manager of Buick. Mr. Chrysler has been prominent in Buick affairs for several years, and to him must be given a great deal of the credit for the wonderful growth of the Buick organization.

—

Macauley Packard President—Joy Heads Board of Directors

DETROIT, MICH., June 16—At to-day's meeting of the board of directors of the Packard Motor Car Co., H. B. Joy was elected chairman of the board and Alvan Macauley was formally elected president. The 50-per cent. stock dividend on the common stock was ratified. In an interview following the board meeting, Mr. Macauley denied current rumors to the effect that the Packard company had entered, or was about to enter, any of the prevalent combinations or consolidations.

—

Cole Earnings for 1916 Estimated at $360,000

INDIANAPOLIS, IND., June 20—Earnings of the Cole Motor Car Co., this city, for the fiscal year ending June 30, 1917, are estimated at $360,000, or 36 per cent on the stock, which would allow a dividend of 12 per cent per annum, and leave a surplus of $40,000.

This company is offering an issue of common stock at 120 and announces that there are no bonds and no preferred stock. The capital is $1,000,000. Earnings in April were $52,243.13.

—

Emerson-Brantingham to Build Bodies

ROCKFORD, ILL., June 17—The Emerson-Brantingham Co., this city, for 62 years manufacturers of farm implements and who are the builders of the Big Four and Emerson farm tractors, plan to install, about Aug. 1, a department for the manufacture of automobile bodies and fenders.

Auto Body Capital $1,000,000

Increased from $500,000—209 Per Cent Stock Dividend Declared

LANSING, MICH., June 13—The Auto Body Co. will increase its capitalization from $500,000 to $1,000,000, the increase having been authorized at a meeting of stockholders Monday afternoon. A 209 per cent stock dividend was authorized for distribution among stockholders of record July 1, with a cash dividend of 5 per cent June 30.

Increase in business for 1916 has necessitated another addition, now in process of building, which will double the shop capacity, and add several hundred men to the present force.

—

Canadian Corporation to Use Greenstreet Gasoline Process

PORT HOPE, ONT., June 18—The Canadian Gasoline Corp., with a capital of $3,000,000, has acquired the Canadian patents for the Greenstreet process of gasoline manufacture. The company will be opened as a subsidiary of the Gasoline Corp. of the United States, according to the present plans. The syndicate financing the proposition is headed by H. T. Bush, president of the Standard Ideal Co., this city. Sir Donald Mann and Nathaniel Curry, president of the Canadian Car & Foundry Co., are represented in the syndicate.

—

Changes Name to Bound Brook Oil-less Bearing Co.

BOUND BROOK, N. J., June 19—The Graphite Lubricating Co. has altered its title to Bound Brook Oil-less Bearing Co., the better to indicate the nature of its business. Some confusion had resulted from the old title, which gave the impression that graphite greases, lubricants, etc., were produced, whereas the company produces only graphite and bronze oil-less bearings and nigrum treated wood oil-less bearings.

—

Fenders on Chicago Trucks

CHICAGO, ILL., June 20—For the second time in the last 2 years, the Chicago city council passed an ordinance requiring fenders on motor trucks. The new ordinance becomes effective Jan. 1, 1917, unless it is again repealed before that time. The first law was held illegal.

Dealers' organizations and heavy users of motor trucks in this city who were first influential in proving the original ordinance unconstitutional are as thoroughly convinced of the unfairness of the new law and will probably strongly contest its adoption.

Body Features 1917 Dorris Six

Lubrication Is by Force Feed —Few Mechanical Changes —Price Unchanged

ST. LOUIS, MO., June 19—The Dorris IB-Six for 1917 is an entirely new car in appearance, having a body of better lines and a radiator which is a distinct departure from the former type. The mechanical changes are few; in fact no radical alterations have been made except in the oiling system, which is now of the force-feed type. The price of $2,475 remains unchanged.

The fundamental construction of the car has not been changed in 11 years. The motor is 4 by 5 in., in unit with the clutch and gearbox. The valves are in the head and the wheelbase is 128 in. and tires 36 by 4½ in.

The gear train drive of starter has been discontinued and the Bendix system is used in its place. The two-unit Westinghouse starting and lighting system and Bosch magneto ignition are continued without material change except in the starter drive as mentioned above, and the routing of wires from the new aluminum dash.

—

No Summer Changes by King

DETROIT, MICH., June 19—Artemas Ward, Jr., president of the King Motor Car Co., has issued a statement to King dealers that, following the policy of the King Motor Car Co. in preceding years, this company will make no mid-year announcement of new models or prices.

—

Walsh Joins Chalmers

LOS ANGELES, CAL., June 16—Christy Walsh, for more than 2 years advertising manager with the Greer-Robbins Co., Southern California and Arizona distributors of the Chalmers and Hupmobile, has resigned to accept the appointment of Pacific Coast advertising manager for the Chalmers factory. Mr. Walsh was a newspaper cartoonist before his début into the automobile industry.

—

Lie Joins Maxwell

DETROIT, MICH., June 17—Christian Lie, with an extensive knowledge of automobile activities in foreign countries, has joined the Maxwell Motor Co. He will represent that company in Scandinavia.

—

K. P. Mfg. Co. Formed

NEW YORK CITY, June 19.—The K. P. Mfg. Co., this city, has been incorporated and takes over all of the interests, including the trade name, trade marks, patents, good will, etc., of the former copartnership known to the trade as the K. P. Foot Rest Heater Co.

This new company will continue to make the K. P. foot rest heater as well as the K. P. universal rim tool and other specialties soon to be announced. It is incorporated at $25,000, the capital being fully paid in.

It is the new company's intention to make the heater in three sizes and prices; the $25 model for high-priced cars, another model at $15 and another one for the smaller car trade. The rim tool will be continued at $2 for the present.

—

Smith Succeeds Stewart

CHICAGO, ILL., June 15—The directors of the Stewart-Warner Speedometer Corp. have elected C. B. Smith president to fill the vacancy caused by the death of J. K. Stewart. Mr. Smith was secretary and treasurer. Vice-President T. T. Sullivan has been chosen to assume additional duties of treasurer, and W. J. Zucker has been elected a vice-president and secretary. Mr. Zucker has been elected a director to fill the vacancy in the board resulting from Mr. Stewart's death. L. H. La Chance has been elected chairman of the board.

—

Burdicks Leave New Era to Build Car

JOLIET, ILL., June 16—Winthrop and W. J. Burdick have sold their interests in the New Era Engineering Co., this city, and, backed by large capital, will introduce a new car in the near future. Winthrop Burdick was treasurer and sales manager of the New Era company and W. J. was purchasing agent.

—

Pennsylvania S. A. E. Meets June 22

PHILADELPHIA, PA., June 16—There will be a meeting of the local section of the Society of Automobile Engineers on June 22 at 8:15 p. m., at the Engineers' Club, 1317 Spruce Street. R. R. Abbott, metallurgical engineer, will lecture on Commercial Heat Treatments of Automobile Steels.

—

Aprahamian Returns to U. S.

RACINE, WIS., June 16—A. Aprahamian, who has been establishing connections for the past year in Australia and New Zealand for the Mitchell-Lewis Motor Co., Racine, Wis., has returned to America. On his return trip he investigated conditions in South America. He will sail soon to do similar work in South Africa, India and the Far East. Mr. Aprahamian has been unusually successful in this missionary work.

Roadaplane Is New Apperson

1917 Model Uses Eight- and Six-Cylinder Engines at $2,000 and $1,750

KOKOMO, IND., June 20—The Apperson Brothers Automobile Co., this city, is the maker of the Roadaplane, its 1917 model, which has been advertised so extensively with much secrecy as to the name of its manufacturer.

The Roadaplane is made in six- and eight-cylinder models, seven-passenger touring and the four-cylinder chummy roadster body being mounted on both chassis. The eight model, either touring car or four-passenger roadster, is $2,000. The six model, either touring car or four-passenger roadster, is $1,750. All prices are f.o.b. Kokomo.

Friction Is Minimized

This car is so built that friction has been reduced to a minimum and light weight is a feature. The six has a 3½ by 5-in. L-head block motor developing 48 hp., and the eight is a 3⅛ by 5-in., V-type, L-head 58-hp. motor in blocks of four. The wheelbase in both is 128 in. A float feed, automatic type of carbureter, positive pressure feed lubrication, hollow crankshaft, vacuum gasoline feed, dual system ignition with distributer and storage battery, two-unit 6-volt starting and lighting system, disk clutch of the dry-plate type, selective sliding gear transmission with three speeds forward and reverse, and worm and gear type of steering gear, are a few of the features of construction on both of the new models.

Other features include: tubular propeller shaft with two universal joints; shaft-driven, demountable floating type of rear axle; I-beam, drop-forged front axle; semi-elliptic springs on front and three-quarter elliptic on rear; service brakes, external contracting, and emergency, internal expanding; and left drive with levers in center.

Novel Top Arrangement

The colors for 1917 are mouse gray, Apperson special green or blue, coach finished with the metal parts in black or nickel. The equipment is complete including mechanical tire pump. The wheels are demountable and 34 by 4-in. non-skid tires are used on the rear. Upholstery is of genuine Turkish-type leather, the backs being made from a single hide.

If the roadster's rear seats are not used the top may be extended as a deck over them, affording protection from dust and rain. In this position it has the appearance of a two-passenger car.

Franklin Addition Under Way

Ground Broken for Extension of Plant Which Will Add 143,000 Sq. Ft.

SYRACUSE, N. Y., June 15—Ground has been broken for an extension of the plant of the H. H. Franklin Mfg. Co., this city, which will provide 143,000 additional sq. ft. of floor space. This is the fourth addition started by the company within 12 months. Upon completion of the building the plant will have facilities for the production of fifty Franklin cars a day. The structure, to be devoted to general manufacturing operations and the shipping department, will represent an investment of $500,000, including machinery. It will be three stories high and constructed of reinforced concrete. Provision is to be made for adding three more floors as requirements demand. The latest Franklin building will span four railroad tracks, permitting all loading under cover.

—

Perlman Building in Jackson

JACKSON, MICH., June 14—The Perlman Rim Corp. is completing a plant in this city. The new building is 360 ft. long and 100 ft. wide. A single line of columns down the center carries 50-ft. trusses and the roof trusses.

—

Schoeneck Plant for Tri-City?

ROCK ISLAND, ILL., June 17—The Owen-Schoeneck Automobile Co. of Chicago is planning to open a factory in one of the Tri-Cities and will select the one making the best site offer and which offers the best shipping facilities. The company has been manufacturing automobiles for 2 years, selling direct to the consumer and avoiding the wholesaler. The Schoeneck six was designed and constructed under the supervision of George Schoeneck. He has also designed a combination truck and tractor which has many novel features and which is designed to sell for $1,000. The Chicago factory has limited capacity, and it is desired to remove to an outside point where overhead expense can be kept to the minimum.

—

Studebaker Trust Formed

SOUTH BEND, IND., June 16—The Studebaker family composed of Clement, G. M., G. M., Jr., and Clement, Jr., have formed the Studebaker Bros. Trust for investment purposes. The capital of the trust is not given out, but it is announced that it is furnished entirely by members of the Studebaker family of South Bend, and that its business will be to hold and deal in investment securities exclusively on its own account.

Following are the directors and officers of the trust: Clement Studebaker, Jr., president; G. M. Studebaker, vice-president and treasurer; G. M. Studebaker, Jr., and Clement Studebaker are also connected with the trust.

Scott Brown, who was formerly general counsel and secretary of the Studebaker Corp., will be a director of the trust and have charge of its offices.

—

Comet Automobile Co. Formed with $1,000,000 Capital

ROCKFORD, ILL., June 17—The Comet Automobile Co., this city, has been incorporated with a capital stock of $1,000,000. The company will manufacture automobiles and commercial trucks. The former will be known as the Comet and will have six cylinders and a wheelbase of 112 in. The price will be about $800. The trucks will sell at about $1,000. The company has rented offices in the Rockford Trust Building. Several floors of this structure will be utilized for workout and testing purposes. Later, factory space will be secured with 50,000 sq. ft. of floor space. It is planned to put 100 men at work, increasing this number as business warrants. Following the acquirement of a temporary location, the company will construct a building with at least 300,000 sq. ft. of floor space. The officers of the new company are the following: President, Harry R. Sackett, Chicago; vice-president, Joseph Callahan, Chicago; treasurer and general manager, George W. Jagers. The secretary will be named later. He is at present engaged with another firm, but will shortly resign to join the Comet company. It is planned to place the first car upon the market Sept. 1. Mr. Jagers will be in active charge of construction. He is a practical engine man, also a body builder and will eventually build the bodies and motors in the Comet factory. The company has not asked Rockford for a bonus. The capital is being acquired from the sale of stock.

—

Bans Gasoline in Tank Cars

BOSTON, MASS., June 17—Fire Prevention Commissioner John A. O'Keefe, whose authority to regulate the storage and handling of gasoline in the Metropolitan district of Boston is supreme, has placed a ban on the hauling of the fluid through the streets in the big tank cars of the railroads. The commissioner made a very thorough study of the explosion that caused such tremendous damage at Detroit when some miles of streets were blown up, and then he began to look for possibilities of a like nature in Boston.

Bour-Davis Plant Planned

Four-Story Building with Capacity of 30,000 Cars a Year for Detroit

DETROIT, MICH., June 19—A modern factory building of four stories is being erected at Fort and Twenty-third Streets, this city, for the Bour-Davis Motor Car Co., organized about 1 year ago to manufacture cars in the $1,250 class. The plant will have a capacity of about 30,000 cars, although that output will not be attempted the first year. Deliveries on the new model are expected to begin some time in July.

The complete official roster of the Bour-Davis company is: President, Chas. J. Bour, president of the National Railways Advertising Co., vice-president of the Chicago, Duluth & Georgian Bay Transit Co., and a director in several other large corporations; vice-president and operating director, R. C. Davis, head of the Chicago, Duluth & Georgian Bay Transit Co.; vice-president and sales manager, C. F. Stewart, who has long been connected with the sale of motor vehicles, principally as distributor for well-known makes in the Pittsburgh field; chief engineer and production manager, A. A. Gloetzner, well known in the trade through his engineering connections with several prominent companies, and lately assistant engineer of the Chalmers Motor Co. The directors are Bour, Davis, Stewart and W. J. Harahan, who is president of the Seaboard Air Line Railway and a director in other enterprises.

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R. & R. Absorber Increases Output

ELGIN, ILL., June 17—D. A. Russell, president of the R. & R. Shock Absorber Co., Elgin, states that this firm will make 100,000 sets of absorbers this year. The plant has been enlarged until its present capacity is 500 sets per day. Due to a scarcity of raw material it has been impossible to keep pace with the orders.

—

Oakland Branch Managers Meet

PONTIAC, MICH., June 17—The managers of the six branches of the Oakland Motor Car Co. were in session at the factory Thursday, Friday and Saturday of last week. This was the annual "get-together" of the managers, to talk over past and future business conditions. While in Pontiac they were the guests of the Oakland officials. Those present at the gathering were: E. J. Kilborn, Chicago; A. B. Tenbrook, Kansas City; R. S. Shoup, Indianapolis; R. L. Losey, Minneapolis; Z. S. Vertner, Philadelphia, and W. R. Tracy, manager of the Michigan branch at Pontiac.

600,000 Chevrolet Bodies

St. Louis Plant Gets Order for 200,000 a Year for 3 Years

ST. LOUIS, MO., June 17.—The revival of river traffic, which recently has begun to loom large to automobile dealers and manufacturers here, received a decided impetus this week through an announcement of Russell E. Gardner, president of the St. Louis Chevrolet company, that he obtained the contract for 600,000 Chevrolet bodies because he was favored with barge freight rates on 100,000,000 ft. of lumber that will be used in their construction. Also that river barge freight rates figure largely in the distribution of these bodies to assembly plants.

The hardwood will be brought from southern points on river barges which average between 750,000 and 1,000,000 ft. load. The factories to receive bodies from the St. Louis plant are located at Minneapolis, Kansas City, Atlanta and Oakland, Cal. The Kansas City plant is reached by Missouri river barges, which are in regular operation and the Minneapolis plant by the Upper Mississippi barges. The Atlanta and Oakland bodies can be shipped by river to New Orleans and then transhipped by Gulf steamers and through the Panama Canal. The 600,000 bodies are to be delivered at the rate of 200,000 a year.

The St. Louis Chevrolet company is now completing additions to each of its two plants, at Broadway and Bulwer and Second and Rutger Streets, at a cost of $50,000 each.

—

Chevrolet Builds in Bay City

BAY CITY, MICH., June 14—The general contract for the erection of a new building for the Chevrolet Motor Co. in this city, has been awarded. The structure will be 50 by 122 ft. and when completed will be used for storage and shipping purposes. A one-story garage, 26 by 83 ft., is included in the contract, besides a shipping platform 18½ ft. wide by 183 ft. in length.

—

Willet Takes Over Rub-On Products

BUFFALO, N. Y., June 19—W. Willet, who originated the Rub-On Mfg. Co. of this city, has taken over the company's line of dressings and finish materials and is now manufacturing under the name of Auto Products Mfg. Co. at 40 Allen Street.

—

Du Pont Buys Fairfield Rubber

WILMINGTON, DEL., June 17—The Du Pont Fabrikoid Co. has purchased the Fairfield Rubber Co. with plants at Fairfield, Conn. The Fairfield company manufactures a coated textile similar to Fabrikoid, and which is used extensively by automobile and carriage manufacturers.

All the present employees will be retained, the change affecting only the owners. The company will not consolidate with the purchasers, but will continue as the Fairfield Rubber Co., endeavoring to uphold, if not better the present standard of its product.

J. K. Rodgers, sales manager of the Du Pont Fabrikoid Co., will act in the same capacity for the Fairfield company.

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Bates Is King Commercial Manager

DETROIT, MICH., June 21—G. J. Bates, for the past 10 years prominently identified with the tire business, has resigned from the Firestone Tire & Rubber Co. to become commercial manager for the King Motor Car Co., this city. Mr. Bates for the past 3 years has handled the manufacturers accounts in Michigan for the Firestone company and for 7 years previous to this he was a department manager for the Diamond tire company.

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Corliss Truck Enters Field

MILWAUKEE, WIS., June 17—The incorporation of the Corliss Motor Truck Co., Corliss, Wis., presages the establishment of a large commercial car factory at Corliss in the plant formerly occupied by the defunct Wisconsin Engine Co. The corporate articles are signed by members of a law firm of Milwaukee.

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Albion Bolt Co. Formed

GRAND RAPIDS, MICH., June 13—The Albion Bolt Co., incorporated for $10,000, is to engage in the manufacture of bolts and nuts for automobiles, with the making of other car parts as a side line. The officers and organizers of the company are Mark Merriman, president; C. B. Hayes, vice-president; Otto Schwacha, secretary, and W. C. Morrey, treasurer.

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Thermoid Coupling on Velie and Reo

NEW YORK CITY, June 16—The Thermoid Rubber Co., Trenton, N. J., announces that the Velie Motor Vehicle Co. and the Reo Motor Car Co., Lansing, Mich., have adopted for standard equipment the Thermoid hard fabric flexible coupling.

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R. C. Durant Goes to Oakland, Cal.

LOS ANGELES, CAL., June 17—R. C. Durant, Los Angeles, Cal., son of W. C. Durant, has left Los Angeles and will make his headquarters at Oakland, Cal., where he will have charge of the Chevrolet assembling plant with Norman De Vaux. Messrs. De Vaux and Durant have the Chevrolet distribution throughout California, Oregon, Washington, Idaho, Arizona and Nevada.

Texas Farms Bring Prosperity

Automobile Business Stimulated and Record Sales Are Predicted for 1916

DALLAS, TEX., June 16.—That conditions in Texas are better at this time than they have been since the establishment of the Federal Reserve Bank system is indicated by the June report of the system at Dallas. It is estimated that 40 per cent. of the $4,000,000 worth of paper on live stock, etc., is held by the Dallas bank as the result of the operations with the smaller banks.

This prosperity is throughout Texas and is caused by the prospects of the farm outputs for this year. North and Central Texas is in the midst of the harvesting season and indications point to a great harvest. Prospects are also good for a big corn and cotton crop.

These indications, automobile dealers declare, are stimulating the automobile business. Last year Texas did $25,000,000 worth of business in the Texas field and indications are that the business this year will be even greater. L. B. Alford, Texas manager at Dallas for the Studebaker Corp., has just returned from a trip through Southern and Central Texas. "Business compared with last year is much better," he said. "However the Southern part of the State is badly in need of rain. The drought is making business dull in that section of the State. In other parts, however, business is much better than at this time last year. For example, last year we did practically nothing in East Texas. This year we are doing a good business. In several parts of the State conditions are the same. Of course we can't tell what may happen. People throughout Texas, with the possible exception of the Southern part of the State, seem to be in a more prosperous condition than last year. This is proved by increased business in the automobile field."

D. F. Anderson, assistant manager for the Buick Automobile Co. at Dallas, declared conditions are so much better than in 1915 that there is no comparison.

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New Law in Porto Rico — Car-Operating Costs High

SAN JUAN, PORTO RICO, June 15.—Beginning July 1 Porto Rico will have a new automobile law which will affect the 2500 cars of all kinds now here. Heretofore each car has paid into the Insular Treasury $5 a year and a special internal revenue tax against the declared value of the car. Now, however, the legislative bodies have decided to increase the Insular tax to 50 cents a horse-

power for each car below 40 hp., and $1 a horsepower above that rating, the horsepower to be ascertained in every case by squaring the diameter of one cylinder, multiplying the result by the number of cylinders and then multiplying that result by 0.4. This will give the official horsepower, according to the local laws and will take precedence over the manufacturers' rating.

In addition to the foregoing, every prospective chauffeur will have to pay into the public coffers $5 to secure his papers to drive a car, and in addition to this will have to give unequivocal reference as to his ability and personal respectability and responsibility.

Jitneys, of which there are about 100 in San Juan and suburbs, will pay a license of $25 per year over and above the aforementioned taxes and will be held responsible for accidents occurring in their vehicles.

Automobile tourists from abroad will pay a tax of $1 per month on each car during their stay on the island.

As gasoline here now costs 36 cents a gallon and is still going up, with no prospect of relief from the two only companies here, many people of moderate means are selling their cars.

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Wolverine Capital Is $200,000

TOLEDO, OHIO, June 20—The Wolverine Automobile Co., capitalized at $200,000, will establish an automobile plant in this city, where it will manufacture a four-cylinder car. Manufacturing will be started about July 1.

The officers are: President and general manager, A. H. Collins of Detroit; secretary, E. W. Burg, Toledo; and treasurer, H. E. King, Toledo.

The Old Com-pakt furniture building on Dorr Street, with 9 acres of ground, will be used for manufacturing. About 1000 cars will be made the first year, it is said.

The company will make cars ranging in price from $1,500 to $2,500 in two, three and four-passenger roadster models, a four-passenger touring model, four-passenger sedan and a two-passenger coupé.

Stutz M. C. Co. of America

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H. C. Stutz Retained as Pres.—75,000 Shares of No Par Value

NEW YORK CITY, June 21—The Stutz Motor Car Co. of America will take over the Stutz Motor Car Co., Indianapolis, as a result of a new plan of re-financing the permit of expansion. Allan A. Ryan & Co., this city, G. H. Saylor of the Chase National Bank, S. A. Fletcher of the Fletcher American National Bank of Indianapolis, H. C. Stutz, H. F. Campbell, and R. E. Maypole will serve on the board of directors. Mr. Stutz will remain as president, Ryan will be vice-president, Saylor secretary and treasurer and Campbell chairman of the board.

The capital will consist of 75,000 shares of no par value, of which amount 37,500 shares have been syndicated and sold to the public at $55.

The Stutz company has no preferred stock or bonded debt. Earnings for the current year are running between $600,000 and $800,000.

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Copper Down ½ Cent

NEW YORK CITY, June 20—Copper and open-hearth steel featured last week's market quotations with drops in prices. Copper declined ½ cent on Thursday to 27½ cents a pound, and open-hearth steel went down to $40 a ton, a drop of $2. Both up-river Para and Ceylon rubber declined, supplementing the recession of the previous week. Para closed yesterday at 63½ cents a pound, a loss of ½ cent, while Ceylon closed ½ cent lower at 62.

The automobile makers continue actively in the market for special kinds of steel and automobile parts. The demand for rivets and bolts from this industry is especially pressing. One prospective contract covers 22,000,000 bolts and 20,000,000 nuts for shipment over the next 4 months. The general demand for rivets and bolts, however, has been well satisfied and manufacturers, with capacity well sold, are refusing to quote on some of the automobile manufacturers' inquiries.

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Mosler Need Not Change Form or Size of ½-In. Superior

NEW YORK CITY, June 17—Under the decision of Judge Hand, announcement of which was made in THE AUTOMOBILE for May 25, A. R. Mosler & Co. may manufacture and sell the Mosler Superior half-inch type plug in the identical form and proportions which have always characterized it, the only requirement being that no plugs manufactured and sold by the Mosler company can have the black finish nor the brand printed in red. The case was that of the Champion Spark Plug Co. against A. R. Mosler & Co. in the U. S. district court for the southern district of New York.

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Halts U. S. L. Stock Sale

NEW YORK CITY, June 16—F. A. Bagg, a stockholder of the United States Light and Heat Corp., yesterday filed in the Supreme Court an action to restrain the directors from selling preferred stock at $4.50 a share and common stock at $2 a share. He obtained a temporary stay.

Bagg charges waste and misuse of the company's funds by the officers and majority directors of the corporation. The defendants include J. A. Smith, president; E. H. Gold, vice-president; C. L. Lane, secretary, and A. H. Ackerman, treasurer. It is alleged they are about to sell $290,000 of preferred and $250,000 common stock at the above prices, which prices are about $1 less than the market.

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Dividends Declared

Linde Air Products Co.; quarterly of 1½ per cent on preferred and 2 per cent on common. Preferred payable July 1 to stock of record June 20 and common payable June 30 to stock of record June 20.

Edmunds & Jones; initial dividend of $1 per share, payable July 1 to holders of record June 20.

Billings & Spencer; quarterly of 2 per cent and extra of 3 per cent.

J. I. Case Threshing Machine Co.; quarterly of 1¾ per cent on preferred, payable July 1 to holders of record June 12.

Packard Motor Car Co.: 50 per cent stock dividend on common, payable Aug. 1 to stock of record June 16. The amount of common now outstanding is $7,771,830.

Springfield Body Corp.: 3 per cent on preferred, payable July 1 to stock of rec-

Daily Market Reports for the Past Week

Material	Tues.	Wed.	Thur.	Fri.	Sat.	Mon.	Week's Ch'ge
Aluminum, lb.	.60	.60	.60	.63	.63	.63	+ .03
Antimony, lb.	.21½	.20½	.20½	.20½	.20½	.20½	— .01
Beams and Channels, 100 lb.	2.67	2.77	2.67	2.67	2.67	2.67	...
Bessemer Steel, ton	45.00	45.00	45.00	45.00	45.00	45.00	...
Copper, Elec., lb.	.27½	.27½	.27½	.27½	.27½	.27½	...
Copper, Lake, lb.	.27½	.27½	.27½	.27½	.27½	.27½	...
Cottonseed Oil, bbl.	10.75	10.90	10.60	10.57	10.60	10.90	+ .15
Fish Oil, Menhaden, Brown, gal.	.55	.55	.55	.55	.55	.55	...
Gasoline, Auto, bbl.	.24	.24	.24	.24	.24	.24	...
Lard Oil, prime, gal.	1.05	1.05	1.05	1.05	1.05	1.05	...
Lead, 100 lb.	6.80	6.88	6.88	6.80	6.80	6.75	— .05
Linseed Oil, gal.	.66	.66	.66	.66	.65	.65	— .01
Open-Hearth Steel, ton	42.00	42.00	40.00	40.00	40.00	40.00	—2.00
Petroleum, bbl., Kansas, crude	1.55	1.55	1.55	1.55	1.55	1.55	...
Petroleum, bbl., Pennsylvania, crude	2.60	2.60	2.60	2.60	2.60	2.60	...
Rapeseed Oil, refined, gal.	.92	.92	.92	.92	.92	.92	...
Rubber, Fine Up-River, Para, lb.	.64	.64	.64	.63½	.63½	.63½	— .00½
Rubber, Ceylon, First Latex, lb.	.64½	.63½	.63½	.61	.62	.62	— .02½
Sulphuric Acid, 60 Baume, 100 lb.	3.00	3.00	3.00	3.00	3.00	3.00	...
Tin, 100 lb.	43.50	43.25	42.75	41.50	41.50	41.00	—2.50
Tire Scrap, lb.	.05¾	.05¾	.05¾	.05¾	.05¾	.05¾	...

ord June 22. This dividend covers 1 per cent from period from Feb. 15 to April 1, and regular quarterly of 2 per cent for quarter ended June 30.

Hupp Motor Car Corp.: quarterly of 1¾ per cent on 7 per cent cumulative preferred, payable July 1 to stock of record June 20.

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Motor Products Directors Announced

NEW YORK CITY, June 6—The board of directors of the Motor Products Corp. will be composed as follows: W. C. Rands, D. B. Lee, C. F. Jensen, all of Detroit; H. H. Seeley of Ann Arbor, and Sol Wexler of J. S. Bache & Co. W. C. Rands will be president.

The tangible assets of the corporation aggregate over $2,500,000, or equal to $35 per share of stock.

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Chalmers Earns $300,000 per Month

DETROIT, MICH., June 15—The earnings of the Chalmers Motor Co., this city, it is stated, are running better than $300,000 per month. In 5 months the sales were more than twice the shipments of any one year's business. The sales department to date is several thousand orders ahead of the production.

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Moon's May Business Doubled

ST. LOUIS, MO., June 14—The business of the Moon Motor Car Co., this city, for May was double that of May, 1915, in cars shipped and four times the same month last year in cars ordered. The additional output was handled with only an increase of 33 1/3 per cent in the factory employees. The company has been receiving materials in larger quantities so that it has been able to keep about a month ahead of the demand.

Security Prices Tumble

Possibility of War with Mexico Influences the Downward Movement of Stocks

NEW YORK CITY, June 20—A sudden drop in automobile security prices occurred yesterday on the Stock Exchange and Curb market. The whole list was influenced by the troublesome Mexican situation and some of the declines were violent. Chevrolet reflected the small demand for it by selling off 9 points yesterday and 38 points for the week. Willys-Overland broke 5 points; and General Motors 14 points.

During the middle of last week when announcement of the abandonment of the big merger was made, Willys-Overland dropped more than 25 points but recovered some of the loss later in the day. The fact that there was no wide open break in the motor shares showed an absence of alarm in speculative quarters at the news. Immediately after the announcement reports were current that bonuses in stock are to be given out by some of the leading concerns. The stocks at present are selling so high that ordinary traders will not touch them because of the wide fluctuations that naturally result.

By issuing new stock the market price could be brought down to a figure where brokers would encourage transactions.

The present high scale of prices brings to mind the great boom in automobile stocks on the Italian bourses in 1905 and 1906, when the shares of the Fiat company went from 25 lire par, to 2300 lire. Possibly to broaden the market, the par value was reduced to 10 lire, and sold in November, 1906, at 750. In May, 1908, they fetched 34 lire in the open market. The American panic of 1907, bringing a smaller demand for foreign automobiles, had much to do with the collapse of the Italian motor boom.

The scarcity of Firestone stock has brought it up to 880. Firestone lately has changed hands in small lots only; nothing is announced as to melon prospects.

Firestone's $3,000,000 common now has a theoretic market value as made by quotations of materially over $26,000,000. There is a $1,000,000 par preferred outstanding.

Goodyear stood well under fire this week and a small lot brought 233. The preferred interim certificates had fairly brisk trade at 106½.

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Third Dividend for Milwaukee Motor Creditors

MILWAUKEE, WIS., June 17.—The creditors of the Milwaukee Motor Co., bankrupt, are about to receive checks for a third dividend of 20 per cent, amounting to $53,598.73, declared at a meeting on June 16. At the same time a 100 per cent dividend of $7,179.89 was declared on wage claims, and a 10 per cent dividend on unsecured claims, amounting to $2,068.40, making a total payment of $62,847.02. Final settlement of the bankruptcy is delayed pending the settlement of a claim of $13,062.35 made by A. J. Farmer, Detroit.

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Pilliod Motor Petitioned

TOLEDO, OHIO, June 16—The Pilliod Motor Co., this city, has filed a bankruptcy petition in the U. S. court. The liabilities are $30,320.55 and the assets $9,559.92.

Automobile Securities Quotations on the New York and Detroit Exchanges

	1915 Bid	1915 Asked	1916 Bid	1916 Asked	Wk's Ch'ge
Ajax Rubber Co. (new)	..	..	66	68	—2
Chalmers Motor Co. com	92½	95†	160	185	—80
Chalmers Motor Co. pfd	95	98½	100	103	..
Chandler Motor Car Co	..	..	107¼	108¼	—9¾
Chevrolet Motor Co	..	..	222	225	—38
Electric Storage Battery Co	..	..	63½	64½	+1½
Firestone Tire & Rubber Co. com	490	495	880	..	+20
Firestone Tire & Rubber Co. pfd	110	..	112	114	—1
General Motors Co. com	151	153	476	541	+1
General Motors Co. pfd	101	102¼	113½	114¼	+ ½
B. F. Goodrich Co. com	51	53	74⅛	75	—3⅞
B. F. Goodrich Co. pfd	100	103†	115⅜	116	— ⅛
Goodyear Tire & Rubber Co. com	263	268	233	236	+3
Goodyear Tire & Rubber Co. pfd	106	107½	106½	107¼	+1½
International Motor Co. com	13	15	10	14	..
International Motor Co. pfd	34	36	20	25	..
Kelly-Springfield Tire Co. com	158	162	72	73	—2½
Kelly-Springfield Tire Co. pfd	86	87	94½	98½	+1½
Maxwell Motor Co. com	43	44	82¾	83	—2¾
Maxwell Motor Co. 1st pfd	86	88	87⅜	88	— ⅞
Maxwell Motor Co. 2d pfd	37	38	57¼	57½	— ¼
Packard Motor Car Co. com	103½	..	..	250	..
Packard Motor Car Co. pfd	96½	99	100	105	—1
Paige-Detroit Motor Car Co. (new)	..	..	53	57	+3
Peerless Motor & Truck Corp	..	..	24½	25½	—2½
Perlman Rim Corp	..	..	..	..	..
*Reo Motor Truck Co	14½	15½	37½	38½	+ ½
*Reo Motor Car Co	32	33	43½	44½	..
Saxon Motor Car Co	..	..	80	83	—4½
Stewart-Warner Speed. Corp. com	68½	69½	93	95	—9
Stewart-Warner Speed. Corp. pfd	105	..	..	..	..
Studebaker Corp. com	75½	77	136½	137	—5½
Studebaker Corp. pfd	99	101	107¼	111	+ ¼
United Motors Corp	..	..	73	74	—5¼
U. S. Rubber Co. com	64	66	53¼	53¾	—2⅞
U. S. Rubber Co. 1st pfd	106½	108	109	109½	— ⅝
White Motor Co. (new)	103	108	56	56½	—3¼
Willys-Overland Co. (new)	129	130	275	276	—29
Willys-Overland Co. pfd	103	105	108½	109½	—4

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

Auto Body Co	..	..	36	..	+ ½
Chalmers Motor Co. com	92	96	..	190	..
Chalmers Motor Co. pfd	95½	98½	..	105	..
Continental Motor Co. com	175	190	38	39	—3¾
Continental Motor Co. pfd	..	86	9¾	10¼	+ ¼
Ford Motor Co. of Canada	1000	..	380	400	..
General Motors Co. com	151	155	475	545	+5
General Motors Co. pfd	101	103	113	116	—2
Maxwell Motor Co. com	43	45	85	87½	— ½
Maxwell Motor Co. 1st pfd	86½	88½	88	90½	+1
Maxwell Motor Co. 2d pfd	37	39	58	61	+1½
Packard Motor Car Co. com	103	..	..	225	..
Packard Motor Car Co. pfd	96¼	99	102	104	+1
Paige-Detroit Motor Car Co	..	..	..	†56	..
*W. K. Prudden Co	19½	21	42½	44	+1½
*Reo Motor Car Co	..	32½	31¼	32	—12¾
*Reo Motor Truck Co	14½	15⅛	..	37¼	..
Studebaker Corp. com	76	77½	138	140	—2½
Studebaker Corp. pfd	100	102	101	..	—8
C. M. Hall Lamp Co	..	..	..	34	..

INACTIVE STOCKS

*Atlas Drop Forge Co	..	26	.	40	..
Kelsey Wheel Co	200	..	.	350	..
Regal Motor Car Co. pfd	..	25	1	..	..

*Par value $10; all others $100. †Ex-dividend.

Resta Wins from De Palma

His Peugeot Establishes New 10, 24 and 50 Mile Speedway Records at Chicago

CHICAGO, ILL., June 18—Dario Resta in his Peugeot defended his title of speedway champion to-day by defeating Ralph DePalma in his Mercedes and besides, established new American records for 10, 24 and 50 miles. Setting a terrific pace, he captured all three heats, though the margin of lead in his favor was never large.

There was a popular feeling at last Sunday's race that DePalma's Mercedes was as fast as Resta's Peugeot and the expression was current that Resta's winning was more the result of luck than of speed or superior speedway generalship. It was to settle this that the speedway hung up a price of $5,000 for a match race between Resta and DePalma and it was agreed to run three heats—one of 10, one of 24 and one of 50 miles—the winner of two heats to take the entire purse and the loser to get nothing. Besides the $5,000 a trophy was also hung up for the winner of the day's contests.

De Palma Gets Pole

In the first heat of 50 miles DePalma won the pole position in a toss-up, but Resta jumped into the lead on the first lap and held it through the second, maintaining a speed of better than 100 m.p.h. although DePalma was close on his heels all of the time, and in the 5th mile, Resta was forced to stop at the pits to tighten a loose spark plug wire and DePalma took the lead. At the end of 28 miles, the same spark plug wire on Resta's Peugeot loosened and he stopped at the pits 53.6 sec. while DePalma put on more speed and by the time Resta got away from the pits was nearly two laps in the lead. He held the lead then until the end of the 42nd mile when Resta again took the lead, Ralph's speed having dropped appreciably each lap after the 28th mile. As Resta passed Ralph, the Mercedes was hitting on two, but the race was too near over to permit of DePalma stopping and changing plugs and he kept on finishing 21 sec. behind Resta.

Resta Made Two Stops

Resta made two stops and DePalma one and the trouble for each one came soon after passing the pits so that some of these laps were turned as low as 55 m.p.h., and this cut down the general average materially so that Resta's average speed for the 50 miles was only 96 m.p.h., or 2½ m.p.h. slower than his average for the 300 miles a week ago.

The lap by lap summary of the 50-mile heat follows:

Miles	Leader	Lap time	Lap M.P.H.
2	Resta	1:11 3/5	101
4	Resta	1:12	100
6	DePalma	1:12	100
8	DePalma	1:12 1/5	99 3/4
10	DePalma	1:13 2/5	98 1/4
12	DePalma	1:10 4/5	101 1/2
14	DePalma	1:09 1/5	103
16	DePalma	1:09 4/5	103
18	DePalma	1:09	104
20	DePalma	1:08 3/5	105
22	DePalma	1:09 3/5	103
24	DePalma	1:09	104 1/4
26	DePalma	1:08 4/5	104
28	DePalma	1:09 4/5	103
30	DePalma	1:16 2/5	94 1/4
32	DePalma	1:22 4/5	87
34	DePalma	1:25 1/5	84 3/4
36	DePalma	1:35 4/5	75
38	DePalma	2:10	55 1/4
40	DePalma	1:19	91
42	DePalma	1:10 3/5	101
44	Resta	1:09 2/5	103 3/4
46	Resta	1:12 3/5	99 3/4
48	Resta	1:12	100
50	Resta	1:23	87

Resta Takes Second Heat

After a 20 min. intermission the next heat of 24 miles was started, Resta winning the pole on a toss. DePalma had spark plug trouble on the preliminary lap and the heat was held 10 min. for DePalma to go to the pits. He came around the track to the starting line and the Mercedes seemed to be in good shape for competition. Ralph took the lead in the first lap setting a pace of 102 m.p.h., but Resta's spurt in the next lap carried him to the front, his pace being 106.5 m.p.h. DePalma never crossed the starting line in the lead except on the first lap but was very close and his speed was terrific. In the third lap Resta held to 105 m.p.h., then a 104 for two laps, then a 102 for the sixth lap and from then on he gave the Peugeot an open throttle and built up his speed so that his average for the ninth lap was 107 m.p.h. and at this point DePalma and Resta were both even in the back stretch, but on the next lap Resta's average was 109 m.p.h., while his average for the eleventh and twelfth laps combined was 109.75 m.p.h. His total time for 24 miles was 13:42.6 and his average 105.1 m.p.h. DePalma's time was 13:45.8 and his speed 104.5 m.p.h.

The lap by lap of the 24 mile race follows:

Miles	Leader	Lap time	Lap M.P.H.
2	DePalma	1:10 3/5	102
4	Resta	1:07 3/5	106 1/2
6	Resta	1:07 2/5	106
8	Resta	1:09	104
10	Resta	1:10	103
12	Resta	1:11 1/5	102
14	Resta	1:10 2/5	102 1/2
16	Resta	1:09 4/5	103
18	Resta	1:07	107
20	Resta	1:06	108
22	Resta	1:06	109
24	Resta	1:06 3/5	108

By winning the two heats in succession, Resta pulled down the $5,000 purse and cup, but inasmuch as three heats were scheduled the third was made an exhibition drive and Resta finished less than three car lengths ahead of DePalma, the former's time for the 10 miles being 5:51.2, an average of 102.5 m.p.h. Had not the first lap been rather slow—92.5 m.p.h.—the average for 10 miles would have been considerably higher since the speed for the second lap was 102; for the third 103; for the fourth 108 and for the fifth 104 m.p.h. DePalma led for 6 miles of the 10-mile exhibition but Resta's turn of the track in 106.4 in the fourth lap brought him to the front in which position he finished.

Immediately after the 50-mile event, Resta offered DePalma a set of plugs which Ralph refused rather than have the impression become current that he was aided by Resta in case he, DePalma, should win the next heat.

In taking the 50-mile heat in 31:57.4 Resta broke the 50-mile mark of 88.87 m.p.h., set by Christiaens at Indianapolis in 1914. Both drivers averaged 101 m.p.h. in the 10-mile event, the best previous record for this distance having been established by George Robertson in a Simplex at Los Angeles in 1910, when he drove 90.99 m.p.h.

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Stutz Features Newark's Night Track Race Meet

NEWARK, N. J., June 17.—J. W. Dickinson, in a 110-hp. Stutz, featured tonight's race meet in this city on the ½-mile dirt track at Olympic Park. The meet was held by the Olympic Park Automobile Racing Assn., under the direction of T. B. Shoemaker, former secretary of the A. A. A. contest board.

In the ½-mile time trials, Dickinson bettered the former track record by negotiating the distance in 37 2/5 sec. An Adams Special, driven by G. W. Adams, won the 3-mile event for cars of 300 cu. in. and under, the time being 4:16 4/5. Dickinson won the next 3-mile event, his time being 4:13 3/5. He also won the 5-mile free-for-all in 6:46, with G. T. Theobald's Mercedes a close second.

The Australian pursuit race of 10 miles was featured by a close race between the Stutz and the Mercedes, so close in fact that a special match race between the two cars was run off and won by the Stutz.

In a time trial, the twelve-cylinder Sunbeam, imported by the Packard company for experimental purposes and recently bought by G. W. Adams of Brooklyn, caught fire and was saved from serious damage by quick work on the part of the driver.

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Record-Breaking Chalmers Remy-Ignition Equipped

NEW YORK CITY, June 17—Due to a misunderstanding, it was stated in THE AUTOMOBILE for June 8, that the Chalmers Six-30, which broke the Chicago to New York record, was equipped with Atwater Kent ignition, whereas Remy ignition is standard equipment on this model.

S. A. E. Standards Divisions Report Progress

(*Continued from page* 1117)

mitted to the Cleveland meeting of the standards committee in April, 1916. The committee again considered that a test should not be accepted without further elaboration, so that many other qualities should be tested simultaneously with the fuel economy. At present, therefore, the Research Division is elaborating a similar scheme for testing acceleration and for determining certain other facts in connection with car performance. The object of this work is briefly summed up as follows:

We do not at present know exactly what constitutes a really scientific test. It has been the practice both here and in Europe to test one thing at a time. We all know that wonderful fuel economy can be attained if acceleration is neglected; that marvelous power at high speed is available by neglecting economy and low speed operation, and so on throughout the range. The formidable task before the Research Division is to consider all these things, forgetting nothing, and to find some test which will cover the whole series at once. The outlook is bright but a good many more meetings will probably require to be held before conclusive action can be taken by the society.

Springs

The Springs Division presented a very full report indeed at the January meeting and since then has been engaged upon matters of detail. Concerning spring clips, which it was thought would be readily amenable to standardization, unexpected difficulties have been encountered.

Truck Standards

The Truck Standards Division commenced the year with a number of subjects before it, of which several have been dropped. The division has also just been entirely reorganized simultaneously with the creation of a new division to be known as the Tire and Rim Standards Division. A very large part of the time of the Truck Standards Division has been given to matters in connection with solid tires and, at its last meeting, considerable progress was made toward obtaining a series of tire capacity tables to which all tire manufacturers would give their assent. Owing to changes in the pneumatic tire rim situation, it is believed that there is a good chance of obtaining agreement on this subject, which was previously considered by the Pleasure Car Wheels Division disbanded at the beginning of the present year. The Tire and Rim Standards Division will therefore take over all the tire subjects until recently for the Truck Standards Division. The latter have as their objective, standardization of the location of motor truck controls. The need for similar positions for gearshift and break levers, or pedals, etc., has been emphasized enormously by the Mexican campaign as well as by the European war. It is also believed that standardization of controls would tend to reduce the number of accidents in the ordinary commercial use of trucks. This is not a matter for averaging up existing practice so much as the question has to be decided on its merits. A great deal of data is being collected and action may be expected shortly

With respect to the reorganization of the Truck Standards Division, it may be explained that this is in part owing to the creation of the military transport committee of the S. A. E. and to the great variety of debatable subjects discussed at the recent meetings of truck engineers organized by the S. A. E. at the request of and in order to assist the War College. The military transport committee will call upon any division of the standards committee for assistance in working out problems which will have to be considered. A great deal of this work will naturally fall upon the Truck Standards Division and it is therefore a good thing the program of the division is fairly open.

Better Engineering in New Regal Four

(*Continued from page* 1127)

made as direct as possible, and with a single opening in the side of the casting to which the Carter carbureter attaches, the passages lead by the shortest paths to the valve chambers, the valves themselves being of large diameter for an engine of this size. Around them plenty of water space has been provided by so designing the cored places that there is no possibility of these being obstructed in the casting.

The new Heinze electrical apparatus has been compactly and efficiently applied to this motor, the combined magneto and generator being located forward on the left, and the starting motor adjacent to the flywheel on the right, to which it connects through the automatically-operated Bendix drive. This cranks the engine at about 175 r.p.m., which is proof of its sturdiness. A pilot arrangement insures proper realignment and resetting of both these units, if they have to be removed for any reason. The coil and regulating switch are mounted on the back of the dash, and the electric system operates in conjunction with a 6-volt, 80-amp.-hr. storage battery.

Passing to a consideration of the new clutch used, this is of cone type, using a pressed-steel cone and having a self-aligning thrust ball bearing to take the thrust of the clutch spring. The spring adjustment is obtained by nuts back of this bearing, threaded to the shaft, the inner nut forming the shoulder against which the thrust bearing acts. This makes a simple construction that is easy to take care of. Another thrust bearing back of the spring takes the load imposed when the clutch is thrown out of engagement, and this is also very simply mounted, with a grease cup provided for lubrication. Gears and shafts in the gearset, the case of which bolts to the flywheel housing, are constructed of nickel steel, and the mainshaft runs on ball bearings, with plain bearings for the jackshaft. To make removal of the gearbox a comparatively simple matter, the clutch throwout lever has been designed to swing down forward enough to allow the front part of the housing to clear.

Continuing back, the drive passes through a specially-designed universal that is of rugged construction made with yokes forged on the ends of the shafts, these yokes at right angles and having machined pins that fit into the two halves of a steel ring. To take it apart the steel outer ring halves have only to be unbolted.

A torsion tube incloses the driveshaft, hinging to a bracket on the rear of the gearcase by means of a yoke, the arms of which are designed to be strong, yet are of sufficient flexibility to take care of any strains that may be momentarily imposed upon them without damage. The axle is three-quarter floating, and uses Hyatts and New Departure bearings. Spiral-bevel gears are fitted, and afford a ratio of 4¼ to 1. Attached to the final drive assembly are the brake equalizers and the operating rods that parallel the axle tubes to the drums, which are 10 in. in diameter and have a face width of 1¾ in.

Much thought has been given the rear cantilever spring

suspension to get away from any side sway that might tear out the spring brackets. The rear pair are 40 in. long and mounted under the frame rails, trunnioned at the center and shackled at the front, with a special mounting at the rear which prevents any axle shifting. The rear attachments are around the axle tubes, and the spring end goes below the axle. This makes a very strong attachment that gets away from a very objectionable feature of many cantilever spring applications.

The frame itself is new to Regal construction, in that it is designed primarily to follow the body line and give it good support, to have sufficient strength at the right places to take care of weaving strains and to forego any chances of breakage or bending. The section is 3½ in. deep, and the flanges have been so widened at the points of change in width that they are very strong. In addition, a substantial cross member is placed at the point where the front ends of the cantilever rear springs attach.

Five passengers are afforded comfortable accommodations in the body, which is given a straight slope from the radiator all the way back, this being the prevailing body fashion. The radiator sets the appearance off well by its sloping line and being a pressing free from the core, is given a high enamel finish. A special point has been made of the fender fitting, to see that the fenders center the wheels as nearly as possible, a thing small in itself but large in its possibilities of increasing appearance. The doors fit snugly and have no moldings at the top; the instrument board is a hardwood panel and running boards are linoleum-covered. The wheelbase is 108 in.

Ninth Used Car Market Report Out

CHICAGO, ILL., June 20—The ninth edition of the National Used Car Market Report has been issued by the Chicago Automobile Trade Assn. From this edition, as not of much value, have been dropped:

Brush, Cameron, Cino, McIntyre, Parry, Rayfield, Richmond, Royal Tourist, Sampson, Vulcan, Warren-Detroit, Welch and Welch-Detroit. Otherwise the book is much the same as the eighth edition.

Added co-operating factories are: Detroit-Electric, Hudson, Hupmobile, Jeffery, Mitchell and Reo. Added co-operating associations are: Columbus Automobile Trade Association, Columbus, Ohio; Tri-City Auto Trade Association, Davenport, Iowa, and Peoria Automobile Trade Association, Peoria, Ill. It is stated that the Boston dealers have lessened their activity in regard to the report, although the association is still listed in the book.

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Tune Up at Des Moines

DES MOINES, IOWA, June 17—Eddie Rickenbacher, captain of the Maxwell racing team, was the first race driver to arrive in Des Moines to start preliminary activities on the Des Moines speedway for the 150-mile sweepstakes on June 26. Mulford, De Palma, Henderson, Chandler, Christiaens, Galvin and other noted entries were not far behind and the speedway is now alive with the activities of preparation for the second annual speedway event. Ralph Mulford, who beat Ralph De Palma in a sensational finish for a distance of 300 miles here last year, will have the same task ahead of him again. Earl Cooper and his Stutz also were early arrivals to make proper preparation for the race. Fred Wagner, official starter of the American Automobile Assn., will give the men the word here. He is also negotiating with Resta to enter the local event. Elimination trials will be held on the 4 days preceding the race and several drivers will attempt to set a new record for the 25 mile distance. Rickenbacher, although an Iowa man, has never before competed in a speedway race in Des Moines and local fans are enthusiastic over the prospect of seeing him in action. Entries in the Des Moines race to date are: Earl Cooper, Stutz; Ralph Mulford, Hudson; Ed Rickenbacher, Maxwell; Eddie O'Donnell, Duesenberg; Josef Christiaens, Sunbeam; Frank Galvin, Sunbeam; Bill Chandler, Crawford; Wilbur d'Alene, Duesenberg; Tom Milton, Duesenberg; Pete Henderson, Maxwell; Dave Lewis, Crawford; W. J. Barndollar, Clergy. The program of race day will include a 50-mile free-for-all in addition to the championship race of 150 miles.

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Pathfinder 12 to Cross Continent on High Gear

SAN DIEGO, CAL., June 17—The Pathfinder which blazed the first transcontinental trail started on its tenth transcontinental trip from the San Diego Exposition to-day. The car will travel over the Lincoln Highway, blazing the trail for the Pathfinder twelve, which is to leave the San Diego Exposition grounds July 3, on a run over the Lincoln Highway with the car sealed in high gear under supervision of the A. A. A.

If successful, the Pathfinder will be the first car to make the transcontinental high gear run.

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Elgin Arrangements Completed

ELGIN, ILL., June 17—The Elgin national road race will be run over the Elgin course on Aug. 19. Final arrangements for financing the event were completed in a conference between representatives of the Elgin Road Race Association, and the Chicago Automobile Club. Prizes aggregating $8,000 will be hung up. Ralph DePalma, twice winner of the Elgin National trophy, is a sure entrant, and boosters of the event are confident that Dario Resta, winner of the Indianapolis and Chicago speedway events, will be among the contenders. Entry blanks will be sent out immediately.

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Fifth Avenue Bus Adopts Moline-Knight

NEW YORK CITY, June 17.—The Fifth Avenue Coach Co., this city, will standardize the Moline-Knight engines for its new equipment exclusively. The company has been experimenting with various types of Knight motors, running over a period of years. All the new equipment will be Moline-Knight motored, and the company's plans are so laid out that production of this equipment will start in July. It now has a few of these machines running.

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Apco Opens Prize Contest

PROVIDENCE, R. I., June 16.—A series of cash prizes is being offered by the Auto Parts Co., this city, maker of the Apco line of specialties for the Ford car, for the best short sales suggestion, story, joke, poem, photograph, shop kink, etc., containing the name of Ford. The first prize is $5, the second $3 and the third $2. There are fifteen $1 prizes. The only restrictions are that the name Ford is used and the copy written on one side of the paper.

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Wolfe Pathfinder District Mgr.

INDIANAPOLIS, IND., June 16—Richard Wolfe has been appointed a district manager of the Pathfinder Co., this city.

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Bay State A. A. on Outing

BOSTON, MASS., June 19—The annual outing of the Bay State A. A., which comprises the prominent motor and accessory dealers in Boston, ended last night when they motored back from Lake Spofford, N. H. after a 3-day trip. There were about 200 men and women present and they went in fifty cars.

Factory Miscellany

Inter-State to Add—The Inter-State Motor Co., Muncie, Ind., is planning an addition to its plant.

Dennsen Motor to Build—The Dennsen Motor Co., Cleveland, Ohio, will build a plant at Coltman Road and East 123d Street.

To Make Trucks—J. B. Barsdale, 618 Tower Avenue, Superior, Wis., is planning to build a $50,000 plant for the manufacture of commercial vehicles.

Gordon Parts to Build—The Chamber of Commerce, Muskegon, Mich., will erect a factory for the L. O. Gordon Co., maker of automobile parts, to cost about $10,000.

Continental Motor to Add—The Continental Motor Co., Detroit, Mich., has granted a permit for the addition to its plant at 3001 East Jefferson Street to cost about $104,000.

Covert to Add—The Covert Motor Vehicle Co., Lockport, N. Y., will add to its present plant a three-story and basement factory, 100 by 130 ft., of steel, concrete and brick, to cost $40,000.

Tube Co. to Build in Louisville—The Compressed Inner Tube Co., producing a solid rubber device for use inside automobile tires, will build a factory in Louisville, Ky., to manufacture this device.

Three New Buildings for Federal Rubber—Contracts for three new factory buildings for manufacturing, shipping and storehouse purposes have been let by the Federal Rubber Co., Cudahy, Wis. These buildings will be fireproof.

Fulton Tractor's Plant—The Fulton Tractor Co. has taken over a plant in Anderson, Ind., in which it will make farm tractors and motors. This is a new company, organized with $300,000 capital.

Pearce Tire Plant Progressing—Excellent progress is being made on the construction of the plant of the Pearce Tire & Rubber Co., Ashtabula, Ohio. It is expected that the building will be completed by Aug. 1.

Champion Equipment Makes First Shipment—The Champion Automobile Equipment Co., Wabash, Ind., made its first shipment of asbestos fabric recently to Ford Madison, Iowa, where it will be used in the manufacture of automobile tires.

To Make Gage—The Badger Crafts Shops, Sheboygan, Wis., has brought out a new type of gasoline gage designed especially for Ford cars and made to substitute for the tank filler cap. The indicator is graduated in gallons in etched letters of such size that they are easily legible, even at night. The apparatus consists of a hollow brass float which is fitted to a spiral upright that turns the indicator on the dial as the gasoline supply is raised or diminished. The gage is protected by a disk of plate glass ⅛ in. thick.

Curtis Plant Taken by Wagner—The Curtis Truck & Forging Co., Decatur, Ill., has sold its plant on North Woodford Street to A. W. Wagner of Terre Haute, Ind., who will open a malleable iron foundry for the manufacture of iron castings for automobiles. The plant will have a capacity of 45 tons daily. Wagner has been engaged in similar industries in Milwaukee and Racine, Wis., and for the past 11 years in Terre Haute. D. E. Willard will be vice-president and Irving Sibley secretary-treasurer of a new company to be formed, with Mr. Wagner as president. Willard and Sibley have been connected with the Allith-Prouty Co. of Danville, Ill. The Decatur plant will be enlarged and improved to the extent of $20,000. It will be ready for operation about Aug. 1.

Canadian Ford Shipments Large—It requires from twenty to thirty freight cars each day to handle the Ford company's shipments in Ford, Ont. As the average train is composed of from twenty to thirty cars, the Ford company's shipments average a trainload of cars a day.

The largest day's shipment so far this season was 314 cars. As most freight cars will only hold five Ford cars (a few of the larger freight cars hold seven), and many carloads go out containing three Ford cars, if the average number is placed at five cars, then it required sixty-three freight cars, or two whole trainloads, to transport this one day's shipment.

The Automobile Calendar

ASSOCIATIONS

July 2-6—Detroit, Mich., World's Salesmanship Congress, Detroit Board of Commerce Bldg.

Dec. 2-9—Electricians' Country-wide Celebration.

CONTESTS

June 22-23—Chicago, Interclub Reliability Run, Chicago Automobile Club.

June 26 — Des Moines, Iowa, Speedway Race, Price Speedway Co.

June 28 — Des Moines, Iowa, Speedway Free - for - All, 300-Mile Race.

July—La Grande, Ore., Track Race, LaGrande Motor Club.

July 4—Coeur d'Alene, Idaho, Race Meet, Hiller-Riegel Co.

July 4—Tacoma, Wash., Speedway Race, Tacoma Speedway Assn.

July 4—Minneapolis 300 - Mile Speedway Race.

July 4—Sioux City Speedway Race.

July 4—Newark, N. J., Track Race, Olympic Park, Auto Racing Assn.

July 4—Visalia, Cal., Road Race, Tulare Co. Auto Club.

July 4—Spokane, Coeur d'Alene, Track Race, Reigel-Hiller Co.

July 4—Benton Harbor, Mich., Track Race, F. E. Fitzsimmons.

July 4—Elmira, N. Y., Track Race, Elmira Auto and Motorcycle Racing Assn.

July — Burlington, Iowa, 100-Mile Track Race, Tri-State Fair.

July 15—Portland, Ore., Track Race, Northwest Auto Assn.

July 15—Omaha, Neb., Speedway Race.

July 15—North Yakima, Wash., Track Race, Hiller-Riegel Co.

Aug. 5—Tacoma Speedway Race, Tacoma Speedway Association.

Aug. 11-12—Pikes Peak, Col., Hill Climb, Pikes Peak Auto Highway Co.

Aug. 12—Portland, Ore., Track Race, Hiller-Riegel Co.

Aug. 18-19—Elgin Road Race, Chicago Auto Club.

Aug. 26—Kalamazoo, Mich., 100-Mile Track Race.

Sept. 1-2—New York, N. Y., Sheepshead Bay Speedway, 24-Hour Race, Trade Racing Assn.

Sept. 4—Elmira, N. Y., Track Race, Elmira Auto and Motorcycle Racing Assn.

Sept. 4—Cincinnati, Ohio, Speedway, Cincinnati Speedway Co.

Sept. 4—Newark, N. J., Track Race, Olympic Park, Racing Assn.

Sept. 4—Indianapolis Speedway Race.

Sept. 4—Des Moines Speedway Invitation Race. Limited to six entries.

Sept. 4-5 — Spokane, Wash., Track Race, Inland Auto Assn.

Sept. 16—Providence Speedway Race.

Sept. 18—North Yakima, Wash., Track Race, Washington State Fair.

Sept. 29—Trenton, N. J., Inter-State Fair. H. P. Murphy, Racing Sec.

Sept 30 — New York City, Sheepshead Bay Speedway Race.

Oct. 7 — Philadelphia Speedway Race.

Oct. 7—Omaha Speedway Race.

Oct. 14 — Chicago Speedway Race.

Oct. 19—Indianapolis, Ind., Race, Indianapolis Motor Speedway.

Oct. 21 — Kalamazoo, Mich., Track Races, Kalamazoo, Motor Speedway.

Nov. 16 and 18—Santa Monica, Cal., Vanderbilt Cup and Grand Prix Races.

GOOD ROADS

Sept. 6-7—St. Paul, Minn., Good Roads Congress, Auditorium.

SHOWS

Sept. 2-9—Columbus, Ohio, Fall Show, Ohio State Fair, Columbus Automobile Show Co.

Aug. 2-9—Hollywood and West End, N. J., Show, Atlantic Exhibition Co.

TRACTOR

July 17-21—Dallas, Tex., Tractor Demonstration.

July 24-28—Hutchinson, Kan., Tractor Demonstration.

July 31-Aug. 4—St. Louis, Mo., Tractor Demonstration.

Aug. 7-11—Fremont, Neb., Tractor Demonstration.

Aug. 14-18—Cedar Rapids, Iowa, Tractor Demonstration.

Aug. 21-25—Bloomington, Ill., Tractor Demonstration.

Aug. 28-Sept. 1—Indiana Tractor Demonstration.

Sept. 4-8—Madison, Wis., Tractor Demonstration.

Sept. 11-16 — Milwaukee, Wis., Fall Show. Wisconsin State Fair, Milwaukee Automobile Dealers.

The Week in the Industry

Baush Machine Opens Detroit Office—The Baush Machine Tool Co., Springfield, Mass., has opened a permanent office in the Dime Bank Building, Detroit. W. Wetsel will be in charge.

N. Y. Marmon Moves—The Nordyke & Marmon Co. last week occupied a new building at 42 and 44 West Sixty-second Street, New York City. The building occupies a plot 65 by 100 ft. It is fireproof and five stories high.

Rives Pedal Pad's New Distributers—The George H. Rives Mfg. Co., New York City, manufacturer of the Rives Never-Slip adjustable automobile pedal pads, has established distributers throughout the country and also in Buenos Aires, Argentina, and Montevideo and Rio Janeiro, Brazil, South America. The company's offices are in the Woolworth Building, New York City, and its factory is at 171 Fulton Street, Brooklyn, N. Y.

Gorey Buys Chalmers Motors—J. C. Gorey & Co., 354 West Fiftieth Street, New York City, have bought over sixty Chalmers motors of the latest type and furnish all or any parts to fit Chalmers cars from 1907 to 1915.

Iowa News Items—The Fisk Tire & Rubber Co. has leased the northeast corner of Thirteenth and Locust Streets, Des Moines, as a site for a new branch house which is to be built there immediately at a cost of $30,000. The Des Moines branch will serve the entire State of Iowa.

A new business block now being constructed at Fifteenth and Locust Streets, Des Moines, will provide a new home for three service stations. These are the Diamond Tire & Supply Co., the Stewart-Warner Co., and the B. & B. Battery Co.

One of the biggest shipments of automobiles ever received in Des Moines was a recent trainload of Chevrolets. The train consisted of thirty-eight cars fully loaded with the Chevrolets. Because box cars were not available the automobiles were shipped on flat cars and covered with canvas. The trainload of Chevrolets made an impressive parade through the city.

Hudson N. Y. Service Building—The Hudson Motor Car Co. of New York plans to build a three-story garage and service building on a site it has purchased on West End Avenue between Sixty-eighth and Sixty-ninth Streets. It will house 600 cars. Ramps will be used instead of elevators and the aisles will be 18 ft. wide.

Packard Opens Accessories Dept. in L. I. City—The Packard Motor Car Co. of New York has opened a branch of its accessories department in Long Island City. A full line of tires, tubes, tire covers and other emergency stock will be carried at all times. The new branch is located in its service station at Thompson Avenue and Hill Street.

Cranston Succeeds Smith—J. P. Cranston has succeeded Gordon Smith as sales manager of the Vim Motor Truck Co., Philadelphia, Pa. Mr. Smith has gone to New York City, where he has taken a similar position in the Manhattan Motors Corp., Vim distributer.

Lolley Joins Timken—W. H. Lolley, formerly connected with the Simms Magneto Co. and the Remy Electric Co., has joined the selling force of the Timken Roller Bearing Co., Canton, Ohio, and will now represent the Timken company throughout the East.

Kansas City Items—The Rice-Sturtevant Motor Co., recently appointed distributer of the Elcar for Kansas and parts of Missouri and Oklahoma, has already established a few agencies.

R. R. Tenney, assistant office manager since February in the Kansas City distributing headquarters of the Maxwell, is now acting as distributing office manager.

Sewell Wheel Opens Baltimore Branch—The Sewell Cushion Wheel Co., Detroit, has opened a branch at 301 Continental Building, Baltimore, Md., and O. H. Jones has been appointed manager of the branch.

Columbus News Items—Plans are being prepared for an additional office building for the John W. Brown Mfg. Co., located on Marion Road near Columbus, maker of automobile lamps and parts.

E. F. Loeffler, one of the pioneers in the tire business in Columbus, has been made manager of the tire department of the Justus & Parker Co., local agent for the Swinehart tire.

The Hill Sales Co., Front and State Streets, has been made agent for seven counties in central Ohio for the products of the Automatic Carburetor Regulator Co., Detroit.

The Standard Motor Car Co., North Fourth Street, central Ohio agent for the Hudson and Milburn, has completed extensive changes to its salesroom. The service station is located at Third and Chestnut Streets.

The Double Tread Tire Co. has opened a retail store at 142 North Fourth Street.

The Columbus Cadillac Co.'s direct factory branch will complete its new building at Broad and Sixth Streets, to be used as a salesroom and service station, about Dec. 1. The structure will be 60 by 187 ft., two stories.

Omaha Retail News—H. P. Neble & Son, who have for many years been connected with Apperson sales in Omaha, have purchased the Omaha Apperson branch and assumed charge. Their territory includes Nebraska, western Iowa and the Black Hills district.

W. S. Barker, distributer of the Dixie Flyer, has opened salesrooms at 2107 Farnam Street.

The Overland Omaha Co. has leased the quarters of the Ford Motor Sales Co. and will take possession when the latter firm moves to the Ford branch factory building now nearing completion at Sixteenth and Cuming Streets.

Wadsworth Body to Build—The Wadsworth Mfg. Co., Detroit, will build a two-story factory, 95 by 350 ft., costing $60,000.

St. Louis Items—W. H. Anderson, for several years agent in St. Louis for the Kelly-Springfield trucks, has joined the local Locomobile Co. to take charge of the sales of Ricker trucks.

Ben Edwards, battery expert of the Willard plant, has arrived here to take charge of the service department of the Battery Service Co., which handles the Willard line.

The Reliable Auto Tire Co., 3117 Locust Street, has added a service department.

Sam Broadbent has been made sales manager for the Frye Motor Car Co. of St. Louis. Mr. Broadbent has been in the printing business in St. Louis for 27 years, and for 14 years was secretary of the Lambert-Deacon-Hull Printing Co.

F. J. Walsh, St. Louis, has been named sales manager of the M. & N. Auto Equipment Co. of that city, distributer of Olson Unit. Mr. Walsh comes from the Riefling Carriage & Auto Co.

Henry Hotze & Son, St. Louis, have been appointed agents in this territory for the Pilot car. The executive offices are at 219 Chestnut Street, the service station being on Magnolia Avenue near Grand Street.

The Moon Motor Car Co. announces the opening of an air system for finishing its cars. R. L. Cleveland, superintendent of the finishing plant, says that, in addition to other advantages, the plant will give the needed increased capacity.